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AN ANALYSIS OF THE FACTORS THAT AFFECT SELF-EMPLOYMENT

by

Stefani April Broome

A Dissertation  
Submitted to the Graduate School,  
the College of Arts and Sciences  
and the School of Social Science and Global Studies  
at The University of Southern Mississippi  
in Partial Fulfillment of the Requirements  
for the Degree of Doctor of Philosophy

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## ABSTRACT

This dissertation research identifies the factors that affect self-employment in a three-essay format. Essay one builds a foundation on analyzing the determinants that affect self-employment in the United States through a country-level time-series analysis. Essay two includes a time-series panel analysis and comparative analysis between the United States and United Kingdom by expanding on Meager's (1992) study of the relationship between unemployment and self-employment. This analysis focuses on the United Kingdom, an outlier in Meager's (1992) study, which included a structural change to the motivation to enter self-employment after an economic shock in the late 1970s. Essay three utilizes a time-series analysis to assess self-employment and its relationship to entrepreneurship on a global scale. This analysis assesses and compares the structure of the current Global Entrepreneurial Model data from 2002 - 2018 and includes 2009 as an indicator variable to determine if the 2007-2008 global financial crisis was, in fact, a shock.

This research adds to the literature on determining who the self-employed are, what factors affect the decision to enter self-employment, if the structure of the self-employment decision changes after a shock, and utilizes these studies to prescribe policy related to self-employment after a shock (COVID-19 as an example). It is found that the profile of the self-employed is increasingly female but is still dominated by males and getting younger in countries other than the United States, where they are still close to or in retirement age. The motivation to enter self-employment is more likely to be out of necessity, even when entrepreneurial aspirations are high, and occurs more in less developed countries. However, it is noted that continuation through the entrepreneurial

process to established business owner is more prominent in more developed countries. Personal income or access to funding is not a significant factor when there are government policies in place to provide funding to those seeking to start a business. Additionally, it is determined that negative shocks to the economy can change the structure of the motivation to enter self-employment. Therefore, providing government policies in light of these economic hardships can increase entrance to self-employment.

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## DEDICATION

This dissertation is dedicated to my husband, Scott. If it were not for his commitment and persistence to chart unknown territory in the real estate and construction renovation fields, I would not have questioned the motivating factors of entrance into the self-employment/entrepreneurial process. Thank you for following your dream and proving that one can be pushed and pulled at the same time.

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## LIST OF ABBREVIATIONS

<i>APS</i>	Adult Population Survey
<i>AR(1)</i>	Autoregressive model of order 1
<i>AR(2)</i>	Autoregressive model of order 2
<i>BBB</i>	British Business Bank
<i>BDS</i>	Business Dynamic Statistics
<i>BHPS</i>	British Household Panel Survey
<i>CARES</i>	Coronavirus Aid, Relief, and Economic Security
<i>CBILS</i>	Coronavirus Business Interruption Loan Scheme
<i>CDFI</i>	Community Development Financial Institutions
<i>CPS</i>	Current Population Survey
<i>EAS</i>	Enterprise Allowance Scheme
<i>EBO</i>	Established Business Ownership
<i>ECIP</i>	Emergency Capital Investment Program
<i>ERISA</i>	Employee Retirement Income Security Act of 1974
<i>FY</i>	Fiscal year
<i>GDP</i>	Gross Domestic Product
<i>GEM</i>	Global Entrepreneurship Monitor
<i>GERA</i>	Global Entrepreneurship Research Association
<i>GESI</i>	GEM Entrepreneurial Spirit Index
<i>I(1)</i>	Model with a unit root integrated order 1

<i>I(0)</i>	Weakly dependent model without a unit root
<i>JRS</i>	Job Retention Scheme
<i>LDC</i>	Less Developed Country
<i>MDC</i>	More Developed Country
<i>MDI</i>	Minority Depository Institutions
<i>MIMIC</i>	Multiple Indicator-Multiple Cause
<i>NES</i>	National Expert Survey
<i>NLSY</i>	National Longitudinal Survey of Youth
<i>OECD</i>	Organization for Economic Co-operation and Development
<i>OLS</i>	Ordinary Least Squares
<i>OPEC</i>	Organization of the Petroleum Exporting Countries
<i>PPP</i>	Paycheck Protection Program
<i>SME</i>	Small and Medium Enterprises
<i>TEA</i>	Total early-stage Entrepreneurial Activity
<i>WBC</i>	Women's Business Center



## CHAPTER I – INTRODUCTION

There is an exorbitant amount of literature on self-employment, its relationship with unemployment or entrepreneurship, and the economic factors that explain who the self-employed are and how they got there (Meager 1992; Noorderhaven et al. 1999; Rissman 2003; Hipple 2004; Dvouletý and Lukeš. 2016; Moulton and Scott 2016; Baker, Égert, Fulop, and Mourougane 2018; Zwan, Hessels, and Rietveld 2018; Freedström, Peltonen, and Wincent 2021). However, there is a continued call for further research on the effects that shocks to the economy have on self-employment (Meager 1992; Reynolds, Hay, Bygrave, Camp, and Autio 2000; Eliasson and Westlund 2010; Freedström, Peltonen, and Wincent 2021). This proposal provides research to fill the gap on how shocks to the economy affect self-employment with the guidance of the following questions: (1) What are the determinants of self-employment in the United States? (2) Do negative shocks to the economy increase or decrease self-employment? (3) What does the structure of the Global Entrepreneurship Monitor (GEM) data look like now?

This dissertation includes three essay studies that will identify the economic and social determinants that affect people's decisions to enter self-employment. These decisions can stem from necessity in times of economic hardship, as defined by the recession-push hypothesis, or as an opportunity to make more money, as defined by the propensity-pull hypothesis (Meager 1992; Congregado, Golpe, and van Stel 2012; Eliasson and Westlund 2013). Self-employment is the action of owning one's own business, working for oneself, by oneself or with minimal employees (Bureau of Labor Statistics 2022a). It is an opportunity to have a higher sense of autonomy, flexibility of one's schedule, and rewarding work outcomes, which all lead to higher work satisfaction

and lower stress (Hessels, Rietveld, and Zwan 2017; Zwan, Hessels, and Rietveld 2018). Self-employment is also identified as the start-up phase to the entrepreneurial process (Swedberg 2003; Dvouletý and Lukeš 2016).

The path to entrepreneurship is paved with innovative ideas that can further an existing product or provide consumers with something new (Todaro and Smith 2017; Center for American Entrepreneurship 2022). This path begins in the start-up phase: self-employment (Swedberg 2003; Dvouletý and Lukeš 2016). While some individuals remain in the self-employment phase longer than others, the key indicator of movement beyond start-up is business growth, or the advancements of ideas and financial resources (Center for American Entrepreneurship 2022). Entrepreneurship is described as a factor to economic growth by providing an increase to a country's gross domestic product (GDP) (Reynolds, Hay, and Camp 1999; Thai and Turkina 2014). An increase in the self-employment phase of the entrepreneurial cycle increases the opportunity for more jobs (Earle and Sakova 2000). This increase in jobs can increase the total output of a country, thereby increasing the country's GDP (Krueger 2020). Additionally, when the outflow from self-employment increases, whether to advance to entrepreneurship or to reenter wage employment, it provides capital acquisitions at lower prices (Benedict and Hakobyan 2008; Borjas 2013). These lower prices provide an opportunity to enter self-employment and begin the entrepreneurial journey (Borjas 2013).

## Self-employment and Entrepreneurship

### *Self-employment*

The Organization for Economic Co-operation and Development (OECD) defines self-employment as an employer, an individual that works for themselves, members of

producers' co-operatives, and unpaid family workers. Holloway and Pimlott-Wilson (2021) state that self-employment includes those individuals who are solo self-employed without employees. However, Dvouletý and Lukeš (2016) describe self-employment as the start-up phase of the business cycle towards entrepreneurship. The reality is that self-employment is both: a survival strategy when there is not an alternative income available, or as evidence of an entrepreneurial desire to be one's own boss (OECD 2022d). The former prompts relationship studies between self-employment and unemployment, while the latter is indicative of a relationship between self-employment and entrepreneurship (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Congregado and Golpe 2011; Horta, Meoli, and Vismara 2015; Baker, Égert, Fulop, and Mourougane 2018).

The relationship between self-employment and unemployment has been profusely debated on which way the relationship occurs (Meager 1992; Congregado and Golpe 2011; Horta, Meoli, and Vismara 2015). When unemployment affects self-employment, a positive relationship is identified. This means that when unemployment increases, self-employment will also increase; indicating that the move to self-employment is out of necessity (Meager 1992; Benedict and Hakobyan 2008; Congregado and Golpe 2011; Horta, Meoli, and Vismara 2015). However, when self-employment affects unemployment, an inverse relationship is identified. This means that when self-employment increases, unemployment will decrease; indicating that movement to self-employment is motivated by the opportunity to make more money (Meager 1992; Benedict and Hakobyan 2008; Congregado and Golpe 2011; Horta, Meoli, and Vismara 2015).

Self-employment is commonly identified as a cyclical relationship that depends on the state of the economy when the decision to move to self-employment is made (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Baker, Égert, Fulop, and Mourougane 2018). Therefore, the relationship between self-employment and entrepreneurship can be explained by the business cycle, which includes the expansion of an economy during times of prosperity (a boom) and contraction of the economy during economic downturns (recession) (Burns and Mitchell 1946; Lucas 2003; Benedict and Hakobyan 2008). The business cycle is not time specific and can have from one to as many as twelve years between cycles (Burns and Mitchell 1946). Lucas (2003) states that the business cycle is more than just the economy's response in quantities and prices to shifts in preferences and technological advancements. Instead, it is a response to monetary shocks to the economy that cause cyclical effects (Lucas 2003). Benedict and Hakobyan (2008) add that when the business cycle contracts (recession), the rise in unemployment leads individuals to choose self-employment out of necessity. On the other hand, when a recession occurs and businesses shut down, it lowers the price of capital equipment and provides an opportunity for new business ventures (Benedict and Hakobyan 2008).

When individuals enter self-employment as a survival strategy, or last option of employment, it is known as a recession-push, or refugee effect. The refugee push hypothesis states that in times of economic downturn, an individual (who is typically unemployed at the time) will turn to self-employment as a last resort for income (Meager 1992; Benedict and Hakobyan 2008; Garba 2012). On the other hand, those who enter into self-employment as an opportunity to make more money is known as a propensity-

pull, or the entrepreneurial effect (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; OECD 2022d). The propensity pull hypothesis includes those individuals that see an economic downturn as an opportunity to be innovative and, in turn, are pulled into self-employment by the prospect of making more money (Meager 1992; Benedict and Hakobyan 2008; Garba 2012; Cullen, Johnson, and Parboteeah 2014).

Therefore, the propensity-pull option provides an opportunity to use the term self-employment synonymously with entrepreneurship (Thai and Turkina 2014). However, the two terms are different. For example, self-employment is viewed as the start-up phase of the business cycle, includes both unincorporated and incorporated individuals working alone or with minimal employees, and typically includes work that is not innovative (Hipple and Hammond 2016). Incorporated self-employment includes receiving corporate structure benefits, tax considerations, limited liability, and the ability to raise capital from selling stocks and bonds (Hipple and Hammond 2016). However, the unincorporated self-employed do not receive the opportunity for those incentives (Bureau of Labor Statistics 2022). Self-employment is often thought of as a way to add income to the household, in addition to an already held full-time wage job. Therefore, the types of jobs that fall under self-employment are not new, innovative ideas, but rather continuations of already existing forms of labor (Scott, Edwards, and Stanczyk 2020; Center for American Entrepreneurship 2022). These jobs include side hustles and 1099 employees, also known as freelancers, who hold an additional job for supplemental pay (Scott, Edwards, and Stanczyk 2020).

## *Entrepreneurship*

Joseph Schumpeter (1918) as referenced in Swedberg (2003) defines entrepreneurship as the combination of putting together existing resources in a new, innovative way. Kirzner (1973, 1997) furthers this definition to include that an entrepreneur is someone who constantly looks to buy low and sell high, maximizing one's profits (Swedberg 2003). Kanter (1983) as referenced in Swedberg (2003) contends that an entrepreneur is an individual who single handedly builds a fortune and empire, and Aldrich (2006) adds that the start-up phase (self-employment) is an important step toward entrepreneurship. The Center for American Entrepreneurship (2022) concludes that entrepreneurship is the process of starting and developing a company to offer new or improved market options. This process includes the start-up phase (self-employment), is run by entrepreneurs, involves financial risk, and is temporary in duration like a phase of the business cycle. Therefore, the key difference between self-employment and entrepreneurship is the aspiration to mature and grow beyond the start-up phase (Center for American Entrepreneurship 2022).

Entrepreneurship is found to be more prevalent in developing economies due to the decrease in barriers to entering the entrepreneurial process (Omri 2020). These barriers include government regulations, taxation, and financial barriers (Wujung and Fonchamnyo 2016; Omri 2020). However, entrepreneurs thrive more in developed economies due to stronger economic and financial systems (DeSoto 2001). Varying economic and financial strength leads to varying levels of entrepreneurship, which is further categorized as either formal or informal entrepreneurship (Thai and Turkina 2014).

Formal entrepreneurship includes economic opportunities like GDP growth, shares of the service sector, innovation, financial growth, and the quality of governance, which provides an ease for doing business (Thai and Turkina 2014). Formal entrepreneurship is encouraged by solid economic and political institutions and regulation, defined property rights, and firm laws (Omri 2020). However, the quality of the government, specifically in emerging economies, also affects if individuals will register their new business (Thai and Turkina 2014; Omri 2020). This also leads to an increase in business owners entering the informal (shadow) economy (Schneider 1997; Schneider, Buehn, and Montenegro 2010).

Informal entrepreneurship includes jobs like babysitting, domestic work, and those individuals not in the labor force (Thai and Turkina 2014). Therefore, while entrepreneurship is indicative of individuals who present new ideas and continue to grow, the informal sector of entrepreneurship aligns with the self-employment (start-up) phase of the entrepreneurial process (Aldrich 2006; Thai and Turkina 2014; Hipple and Hammond 2016). These jobs are more in line with side hustle jobs, or additional income to supplement wage employment, and freelancers (Scott, Edwards, and Stanczyk 2020). The lack of funding in informal entrepreneurship leads to a decrease of participation in this sector or increases participation in the informal economy (Schneider 1997; Schneider, Buehn, and Montenegro 2010; Omri 2020).

### Social and Economic Factors

There are social and economic factors that affect an individual's decisions to enter self-employment. The social factors include demographic information like gender, race, age, and income, and educational attainment (Noorderhaven et al. 1999; Rissman 2003;

Fairlie 2005; Nikolova and Bargar 2010; Dvouletý and Lukeš 2016). The economic factors are those outside forces including current work status, government policy implementation, shocks to the economy, the size of the informal economy, and country status (Meager 1992; Hipple 2004; Borjas 2013; Freedström, Peltonen, and Wincent 2021). Research shows that the demographics of those who are most likely to choose self-employment are native born, older white males that have access to resources to enter the entrepreneurial process (Meager 1992; Noorderhaven et al. 1999; Rissman 2003; Hipple 2004; Dvouletý and Lukeš. 2016; Moulton and Scott 2016; Baker, Égert, Fulop, and Mourougane 2018).

### *Gender*

The male to female ratio of self-employed mimics the statistics on the wage side of employment, concluding that men are more likely to be self-employed than women (Borjas and Bronars 1989; Fairlie 2005; Hipple and Hammond 2016; Kelley et. al. 2022). There is a gender gap in self-employment, which can be attributed to cultural factors, number of children in the household, and extent of educational attainment (Borjas and Bronars 1989; Fairlie 2005; Nikolova and Bargar 2010; Kelley et. al. 2022). For example, Nikolova and Bargar (2010) discuss that in the United States, women have a higher rate of entrance into self-employment in the north over the south due to cultural expectations of staying at home with children. However, as the number of children in the home increases, the need for more household income also increases. The increase in people in the household prompts a need for both parents to work, whether in wage or self-employment (Barro 1997). Additionally, Nikolova and Bargar (2010) found that women



with an increase in education are less likely to enter self-employment, while men with an increase in education are more likely to enter self-employment.

### *Race*

Borjas and Bronars (1989) found that white and asian males are the most likely to be self-employed, with hispanic males coming in lower than both groups, and black males coming in lower than half that of white males. In fact, white males were found to be three times more likely to be self-employed than black males (Borjas and Bronars 1989). Fairlie (2005) utilized the 1979 National Longitudinal Survey of Youth (NLSY79) data to confirm these statistics, reporting that whites have the highest entrance into self-employment with hispanics in second and blacks with the lowest rate. However, Kelley et. al. (2022) reports that as of 2021 there is a significant rise in black self-employed. Additionally, black individuals have a higher intention rate to start a business, a lower fear of failure progressing through the entrepreneurial process, are more motivated and feel more capable of starting a business, and have the highest established business ownership rates among black, white, and Hispanic business owners (Kelley et. al. 2022). For example, the percentage of white males who were self-employed decreased from 8.23% in 1967 to 7.82% in 1975 and again to 7.72% in 1985 (Evans and Leighton 1989).

### *Age*

Research has found that older people are more likely to be self-employed, which is due to an increase in knowledge and work experience, larger networks, an increase in educational attainment, a longer credit history, and greater resources (Earle and Sakova 2000; Rissman 2003; Nikolova and Bargar 2010; Dvouletý and Lukeš 2016; Moulton and Scott 2016; Global Entrepreneurship Research Association (GERA) 2023). Additional

factors include the sheer increased number of people in that age category in more recent decades (i.e., baby boomers) and as an alternative to retirement (Evans and Leighton 1989; Nikolova and Bargar 2010). GERA (2023) concludes that policy implementation should be focused more on those who are younger and recent graduates. For example, the 2021-2022 Global Entrepreneurship Monitor (GEM) report shows 36 of the 47 economies included in the study had a higher rate of entrance into self-employment from the 18-34-year-old category (Hill et al. 2022).

### *Income*

People who have a higher income, or access to funding, are more likely to enter self-employment (Taylor 2004; Dvouletý and Lukeš. 2016). However, income is affected by other economic factors like demographics (gender, age, and race), educational attainment, savings rate, size of the labor population, and country status (Kuznets 1955; Balassa 1982; Kruger 2020). A country's status is identified as either more developed, or economically advanced capitalist countries, or less developed (developing), which is characterized by low levels of living and other development deficits (Torado and Smith 2016). In more developed countries the standard of living, wages, job opportunities, and educational attainment is higher than in less developed countries, which leads to situations of difference in terms of income attainment (Kuznets 1955; Thurow 1970; Sawyer and Sprinkle 2006).

This difference in income attainment, or income inequality, is measured by the Gini coefficient. The coefficient ranges from 0, or perfect equality, to 1, or perfect inequality, however it is typically written as a percent (U.S. Census Bureau 2021). For example, some less developed countries including South Africa, Mozambique, and

Surname have Gini scores of 63%, 54%, and 57.9%, respectively. On the other hand, some more developed countries including the Czech Republic, Belarus, and Iceland have Gini scores of 25%, 25.3%, 26.1%, respectively (World Population Review 2023).

#### *Current work status*

The current work status includes people who are employed, unemployed, or not in the workforce (Dornbusch, Fisher, and Starz 2008; Bureau of Labor Statistics 2022a; OECD 2022b). The employed category includes those who work for wages or profit in a given week, worked at least 15 unpaid hours in a family operation, and those who are currently absent from working for various reasons (Bureau of Labor Statistics 2022a; OECD 2022b). The unemployed are those who are currently laid off from wage employment, those who have actively looked for employment in the previous 4 weeks, or those who are waiting to be called back to a wage job (Dornbusch, Fisher, and Starz 2008; Bureau of Labor Statistics 2022a). Those not in the labor force include students, retired people, those who are taking care of children or elderly family members, and those not actively looking for work (Bureau of Labor Statistics 2022a).

#### *Government policy implementation*

Policy implementation is the execution of basic policy decisions, which relating to self-employment, include increases or decreases in self-employment tax, the lending interest rate, and government allocations to small- and medium-sized businesses (Bryant, Hooper, and Mann 1993; Taylor 1993; Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019; Reynolds, Hay, Bygrave, Camp, and Autio 2000; Cerna 2013). The self-employment tax is the combination of social security, or old-age, survivor, and disability insurance, and Medicaid, or hospital insurance (IRS 2023). This

tax differs from wage employment tax because it does not include unemployment and disability benefits in the event of job loss (Dornbusch, Fisher, and Starz 2008; Baker, Égert, Fulop, and Mourougane 2018; Zwan, Hessels, and Rietveld 2018; Bureau of Labor Statistics 2022a). While there are many types of interest rates (real, nominal, fixed, variable, compound, simple, etc.), the one that directly impacts self-employment is the lending interest rate, which includes short- and medium-term financing (The World Bank 2023). Government allocations include funding to small- and medium-sized businesses, which provides initial or additional financial support to the self-employed (OECD 2017; Abraham and Schmukler 2017; Brown and Lee 2017; Hutton 2017; Dilger, Blackford, and Cilluffo 2022).

#### *Informal economy*

The informal economy is defined as institutional socioeconomic factors including historical culture, traditions, and appropriate behavior as defined by a society (Freedström, Peltonen, and Wincent 2021). It is also described as the shadow economy, which is driven by the increase in taxation, labor market regulations, and quality of public goods and services (Schneider 1997; Schneider, Buehn, and Montenegro 2010). Institutions can both encourage and block progress in the entrepreneurial cycle, which depends on the severity (size) of the informal economy (Schneider 1997; Cullen, Johnson, and Parboteeah 2014). Freedström, Peltonen, and Wincent (2021) found that the size of a country's informal economy determines if and how much government policy implementations will affect self-employment. Thus, increased implementation of government policies does not always positively affect the self-employed (Cullen, Johnson, and Parboteeah 2014; Freedström, Peltonen, and Wincent 2021).

### *Country status*

Development is the process of improving the quality and capabilities of life for all humans by raising the standard of living, self-esteem, and freedom (Todaro and Smith 2017). This process is described as the transformation of a country's economy from stagnation, or no economic movement, to economic growth. Therefore, countries take on one of two identities: more developed countries (MDC) or less developed countries (LDV) (Todaro and Smith 2017). MDCs are economically advanced high income capitalist countries like North America, Japan, Australia, New Zealand, and western Europe. LDCs consist of low-income countries like those in Africa, Asia, and Latin America, with highly imperfect commodity and resource markets, limited information, constant structural changes, and multiple equilibria or even disequilibrium between supply and demand (Todaro and Smith 2017). A country's development status has an effect on entrance into self-employment. For example, developed countries have a higher wage-rate, which increases the opportunity for employment (Akerlof and Shiller 2009; Borjas 2013). Therefore, a country's status has a positive relationship with developed countries and an inverse, or negative, relationship in developing countries (Garba 2012).

### *Shocks to the economy*

An economic shock is an internal or external disturbance that positively or negatively affects an existing economic system (Borjas 2013). Hashiguchi, Yamano, and Webb (2017) define this disturbance as a crisis or natural disaster that affects final expenditures like a country's GDP in terms of consumption, investment, and inventories. Internal shocks include changes to government spending, fiscal or monetary policies, tax increases or cuts, and wages, financial disturbances, and economic expansions and

recessions (Auerbach and Gorodnichenko 2010). External shocks include disturbances from other economies like changes to supply chains, global production structures, exchange rates, and product demand (Hashiguchi, Yamano, and Webb 2017).

A positive shock includes increases in wages, job availability, and government spending, and decreases in taxes and cost of living (Blanchard and Perotti 2002). For example, increased government spending during recessionary times causes larger expansionary effects. This, in turn, leads to increased fiscal policies (i.e., decreased taxes) that aim to stimulate aggregate demand (Auerbach, Alan, and Gorodnichenko 2010). A negative shock includes increases in prices, taxes, and barriers to trade, and decreases to wages, job availability, and production of goods (Blanchard and Perotti 2002). For example, when a recession exists it can affect the employment sector, causing people to lose their jobs, thereby increasing unemployment (Borjas 2013). Those who feel pushed to find an alternative to unemployment will enter self-employment out of necessity (Meager 1992; Benedict and Hakobyan 2008; Congregado and Golpe 2011; Horta, Meoli, and Vismara 2015).

#### Global Entrepreneurship Monitor (GEM)

The aforementioned social and economic factors provide applicable assessments of self-employment data that are tracked and analyzed by entities like the Global Entrepreneurship Monitor (GEM) (Reynolds, Hay, and Camp 1999; Bosma et al. 2008; Bosma and Levie 2009; Bosma et al. 2021). GEM, which began in 1997 as a partnership between Babson College in the United States and the London Business School in the United Kingdom, is a global research team that performs survey-based research on individual and country-level entrepreneurship (Reynolds, Hay, and Camp 1999). It is the

largest on-going study of entrepreneurship in the world and is made up of networked-national country teams associated with top academic institutions (Reynolds, Hay, Bygrave, Camp, and Autio 2000).

The first entrepreneurial study by the GEM team began in 1999 with 10 countries: the United States, France, Israel, Canada, Italy, the United Kingdom, Denmark, Finland, Germany, and Japan, split into levels of entrepreneurial activity. The focus of this organization is to identify the factors that affect entrance into the self-employment process, track progression through the entrepreneurial process, and provide perspective on the relationship between entrepreneurship and economic progress (Reynolds, Hay, and Camp 1999; Bosma et al. 2008; Bosma and Levie 2009; Bosma et al. 2021). Additionally, this study has grown to include up to 60 different countries in a given year that provide in-depth observations on the determinants that affect entrepreneurship (Bosma et al. 2021; Hill et. al. 2023).

### Findings

The remainder of this paper includes the United States as a country-level foundation study in Chapter II, a comparative analysis between the United States and the United Kingdom as it relates to a structural change in self-employment after a shock in Chapter III, a global view of GEM data in Chapter IV, and an overall discussion of the findings and conclusion from the three studies in Chapter V.

Chapter two found that the self-employed in the United States still significantly come from the private sector, their entrance is contingent upon being self-employed the previous year, and they see self-employment as an opportunity to make more money. The self-employed are still older over time, with concentrations in the 55-64 age range,

however the age variables are not significant in this study. Additionally, income and race are not significant factors in this study.

Chapter three includes three studies: an independent study on the United Kingdom and the United States, and a combined study that includes them both. The United Kingdom study found that there was a structural change in the motivation to enter self-employment in the United Kingdom. When the shock years (1981, 1993, 2009, and 2020) are interacted with unemployment, opposite coefficient signs are present, indicating a change from a refugee-push, or entrance out of necessity, into self-employment in 1981 and 2009 to a propensity-pull, or as an opportunity to make more money, into self-employment in 1993 and 2020. The United States did not have a structural change in any of the shock years (1975, 1982, 2009, and 2020). Instead, they all had a positive coefficient, which indicates entrance to self-employment was based on necessity (refugee-push). The combined panel model provided a structural change, yielding positive coefficients for 1975, 1982, 2009, and 2020, which indicates a refugee-push, and negative coefficients for 1981 and 1993, which shows a propensity-pull into self-employment.

Chapter four is an analysis of the Global Entrepreneurship Monitor data. This study found that, on a global scale, people are more likely to enter self-employment if they are in the 45-54 age category, have an undergraduate education, and were self-employed in the previous year. Additionally, the geographical location of a country, the home country's status, and the shock year of 2009 play a role in determining entrance into self-employment. It is noted that this study includes a small number of low-income



countries, which could be why the age is higher than what is reported by the GEM reports.

### Limitations

It is noted that there are limitations to each of these studies due to the lack of consistent and/or longevity of data. For example, Chapter two omits educational attainment and immigration and is an aggregate study, rather than on an individual level. Chapter three omits the self-employment tax rate and government allocation for small and medium sized enterprises (SMEs) in the UK, inflows to and outflows from self-employment, and income data and how it can affect inflows and outflows. Chapter four encountered limited access to current data, a decreased data set due to the study's restrictions, and omitted the analysis of the TEA and EBO relationship. The inclusion of these variables could change the current studies' perspective of the typical self-employed.

## CHAPTER II – ESSAY 1: DETERMINANTS OF SELF-EMPLOYMENT IN THE UNITED STATES

### Introduction

This essay will utilize time series data to determine the factors that affect self-employment in the United States. Self-employment is the action of owning one's own business, working for oneself, by oneself or with minimal employees (Bureau of Labor Statistics 2022a). It is identified as the start-up phase to the entrepreneurial cycle, which includes innovative ideas that can further an existing product or provide consumers with something new (Swedberg 2003; Dvouletý and Lukeš 2016; Todaro and Smith 2017; Center for American Entrepreneurship 2022). Thus, the self-employed play a substantial role in the economic standing of the United States through the entrepreneurial cycle (Swedberg 2003). Previous literature identifies the typical self-employed as white males close to retirement age with access to income (Meager 1992; Noorderhaven et al. 1999; Rissman 2003; Hipple 2004; Dvouletý and Lukeš. 2016; Moulton and Scott 2016; Baker, Égert, Fulop, and Mourougane 2018).

Self-employment data in the United States has been collected since the 1940s through the Current Population Survey (CPS). This data includes social and economic factors, the unemployed, public and private employment, as well as sub-divisions of employed to include wage and salary, self-employed, and unpaid family workers (Hipple 2010). The social factors include age, race, gender, educational attainment, and income (Noorderhaven et al. 1999; Rissman 2003; Fairlie 2005; Nikolova and Bargar 2010; Dvouletý and Lukeš 2016). The economic factors include outside forces like current work status, government policy implementation, shocks to the economy, current political

party, and sector of employment (Meager 1992; Hipple 2004; Borjas 2013; Mayer 2014; Freedström, Peltonen, and Wincent 2021). Further division of the self-employment category includes those that are incorporated and unincorporated (Hipple and Hammond 2016; Bureau of Labor Statistics 2022). Since 1967 the Bureau of Labor Statistics (BLS) has only included data on the unincorporated category (Hipple 2010). However, the OECD (2022d) reports both the incorporated and unincorporated categories as a percent of the working population. This study will utilize the method of ordinary least squares (OLS) from OECD time series data from 1962 to 2020 to determine if these factors are still the overarching identifiable markers of the self-employed.

This study found that the self-employed still significantly come from the private sector, their entrance is contingent upon being self-employed the previous year, they are still older, with concentrations in the 55-64 age range, are positively affected by economic shocks and the interest rate, and income and race are not significant factors. The remainder of this essay includes background information on the United States labor force categories, how self-employment contributes to the development and growth of the U.S. economy, and how the U.S. government plays a role in either supporting or deterring entrance into self-employment.

It is noted that there are limitations to this study, which includes the omission of significant variables due to lack of data. For example, educational attainment, which usually has an inverse relationship with self-employment and immigrants, which usually has a positive effect on self-employment are not included in this study due to insufficient and non-consecutive data (Earle and Sakova 2000; Nikolova and Bargar 2010; Borjas 2013; Dvouletý and Lukeš 2016; Hipple and Hammond 2016). Additionally, the study

includes aggregate data on the U.S. and is not divided by region, state, or individual. This means that the study is looking at the self-employed not on an individual level, which could cause different results.

### Background Information

The self-employed in the United States include males and females from different race and ethnic backgrounds that span all sectors of the labor force. Those sectors include being employed in the private sector, public sector, and from unemployment (Evans and Leighton 1989; Commission of the European Communities et. al. 1993, Hammouya 1999; Borjas 2013; Mayer 2014; Bureau of Labor Statistics 2022a; OECD 2022b; OECD 2022d). The participation rate, on the whole, has ebbed and flowed over the last 80 years including declines during extreme economic shocks to increases during times of economic boom (Burns and Mitchell 1946; Lucas 2003; Benedict and Hakobyan 2008). For example, in the mid-1970s and early 1980s, self-employment increased significantly before declining again into the 1990s and early 2000s (Evans and Leighton 1989).

This can be attributed to the Employee Retirement Income Security Act of 1974 (ERISA) and the Revenue Act of 1978. ERISA established the Pension Benefit Guaranty Corporation which included regulated private pensions and accounting controls. The Revenue Act of 1978 included flexible benefit plans, 401(k) retirement savings plans, and pre-tax contributions (Schwenk 2003). While wage employment was in decline, sufficing policy reform, non-agricultural self-employment was increasing year over year. These self-employed jobs included business start-ups as well as self-employment as a second job (Becker 1984).

Therefore, self-employment plays a substantial role in the economic development and growth of the United States by way of the entrepreneurial cycle (Barro 1997; Reynolds, Hay, and Camp 1999; Swedberg 2003; Todaro and Smith 2017; Center for American Entrepreneurship 2022). For example, fortune 500 companies in the U.S. have lost more than five million jobs since 1980. However, more than 34 million jobs have been added since that time, with most of those job additions recorded in the self-employment portion of the labor force (Zacharakis, Reynolds, and Bygrave 1999). In 1996 alone, small businesses accounted for 1.6 million new jobs (64%) of the 2.5 million created that year (Zacharakis, Reynolds, and Bygrave 1999).

In times of economic crisis, self-employment has provided people with an option to continue to provide income to their household (Eliasson and Westlund 2012). For example, the incorporated self-employed category accounted for 2.8 million workers in 1982, which was an increase from 2.1 million in 1978. Additionally, the Current Population Survey (CPS) of 1980 reported one-third of all employed people also had a second job in self-employment (Becker 1984). Considering this, self-employment is often seen as an alternative to unemployment, rather than as an alternative to wage employment (Rissman 2003; Eliasson and Westlund 2012). However, there is not always a movement from unemployment to self-employment during times of crisis. For example, the financial crisis of 2007-2008 yielded a decline in nascent (self-employment) entrepreneurial activity from a high of 8% in 2005 to 5% in 2009 (Bosma and Levie 2009).

### *The Labor Force*

The labor market includes workers, firms, the government, and in some countries, trade unions (Borjas 2013). The labor force includes workers (employees) and firms

(employers), while the institutions that support them include trade unions and the government (more specifically the policies they implement) (Borjas 2013; OECD 2022a). The labor force is measured by a country's labor participation rate and is calculated by dividing the labor force by the total working-age population, or those between 15 and 64. This indicator is broken into age categories and calculated as a percentage of each group (OECD 2022a). The Bureau of Labor Statistics (2022a) divides the labor force into three categories: employed (civilian and armed forces), unemployed, and not in the labor force (Borjas 2013; Bureau of Labor Statistics 2022a; OECD 2022a).

The employed category includes those who work for wages or profit in a given week, worked at least 15 unpaid hours in a family operation, and those who are currently absent from working for various reasons (Bureau of Labor Statistics 2022a; OECD 2022b). The unemployed category includes those who are currently laid off from wage employment, those who have actively looked for employment in the previous 4 weeks, or those who are waiting to be called back to a wage job (Dornbusch, Fisher, and Starz 2008; Bureau of Labor Statistics 2022a). Those who are not in the labor force include students, retired people, those who are taking care of children or elderly family members, and those not actively looking for work (Bureau of Labor Statistics 2022a).

*Unemployed.* The unemployment rate is calculated by dividing those who are currently unemployed by the total labor force (Borjas 2013; Bureau of Labor Statistics 2022a; OECD 2022d). This rate is not constant across industries, or demographic indicators: i.e., age, race, gender, and education. Instead, the rate fluctuates with the minimum wage and elasticities of the supply and demand for labor (Borjas 2013). The equilibrium between the supply and demand of labor, as known as full employment,

occurs when the amount of labor firms need equals the amount of labor available (Tobin 1972). This does not mean there are zero unemployed, but instead is identified as the maximum aggregate supply of labor. This point, typically between 4% and 6%, occurs when the aggregate demand no longer increases the supply or output of labor (Tobin 1972; Borjas 2013).

The theory of unemployment maintains that firms will pay more for workers to attract them to employment (Shapiro and Stiglitz 1984). The efficiency wage theory of unemployment adds that wages are a means of motivating labor (Akerlof and Shiller 2009). Therefore, people can choose to be employed at a set pay, or choose an alternative, which is usually unemployment. This choice is known as voluntary unemployment (Tobin 1972). Another type of unemployment, known as involuntary unemployment, occurs when there is an excess supply of labor, and the market is slow to adjust to shocks (Tobin 1972; Shapiro and Stiglitz 1984). The natural rate theory states that there is an increase in unemployment when there is an excess in the supply of labor and a decrease in firms' demand for labor (Akerlof and Shiller 2009).

High unemployment is indicative of a large gap between the wages firms will pay and the equilibrium between the supply and demand for labor (Akerlof and Shiller 2009). However, it also depends on the types of unemployment, which are categorized as frictional, seasonal, and structural. Frictional unemployment occurs when the workers looking for jobs and firms looking for workers do not align (Borjas 2013). Easily implemented policy solutions include helping workers identify job openings and firms find the unemployed. Seasonal unemployment relates to short bouts of unemployment in industries like garment and automotive where firms shut down temporarily to retool

(Borjas 2013). Structural unemployment includes the excess of labor with specific skills that do not align with the jobs available. This type leads to longer periods of unemployment and policies that include training unskilled workers (Borjas 2013).

*Employed.* Employment includes people who work full-time, or more than 35 hours a week; part-time, or those who work from 1 to 34 hours a week; summer work, or youth ages 16 to 24 who work in the summer months between school years/semesters; and self-employed, or those who work for themselves and are not considered wage employees (Bureau of Labor Statistics 2022a; OECD 2022b). The employment rate is calculated as the ratio of employed people to the working age population. This rate is sensitive to economic cycles, and in the long run is affected by government policies that support higher education and income (OECD 2022b).

People in the full-time, part-time, and summer categories of employment are described as wage employees. This means that they qualify for unemployment and disability benefits in the event of job loss (Dornbusch, Fisher, and Starz 2008; Baker, Égert, Fulop, and Mourougane 2018; Zwan, Hessels, and Rietveld 2018; Bureau of Labor Statistics 2022a). However, people in the self-employment category do not qualify for these benefits, meaning that when their job is lost or they close their doors there are no policies or benefits in place to support them (Dornbusch, Fisher, and Starz 2008; Bureau of Labor Statistics 2022a).

#### *Private and Public Sectors*

Employment is additionally broken into two sectors within the economy: private and public. The public sector includes market and non-market activities in the general government and public sub-sectors of non-financial and financial corporations



(Commission of the European Communities et. al. 1993, Hammouya 1999). The general government sub-sector includes government units, nonprofit and social security entities, and non-market public and private institutions. The public corporation sub-sector includes institutional units that produce for the market (Hammouya 1999). Public sector employment includes people in areas of management, service, sales, natural resources, and production, albeit at a lower rate than those in the private sector of employment (Mayer 2014).

The private sector comprises individual business owners, corporations, and non-government agencies specifically in manufacturing, hospitality, and financial services. The private sector includes an opportunity for more promotions and higher pay, but less opportunity for job security and benefits (Bureau of Labor Statistics 2022d). Statistically, there is a larger number of people employed in the private sector, however, in more recent years there has been a mass exodus of laborers, specifically in the private sector (Mayer 2014). For example, between August 2021 and March 2022 more than 4 million people left the private sector each month, marking a time known as the Great Resignation (Bureau of Labor Statistics 2023b).

### *Economic Development and Growth*

The Neoclassical growth model identifies the advancement of ideas and technological progress as the engine to economic growth (Jones 2002). This innovation and advancement of ideas begins in the start-up phase (self-employment) of the entrepreneurial cycle (Reynolds, Hay, and Camp 1999; Center for American Entrepreneurship 2022). Economic growth depends on a country's level of output, which

increases when technological advancements are paired with capital accumulation and economic infrastructure (Barro 1997; Todaro and Smith 2017).

Capital accumulation is the savings portion of income used to augment future output and income. This savings leads to future purchases and improvements in capital stock, or the net real value of all physical capital goods like machinery, factories, equipment, and materials (Todaro and Smith 2017; Watson and Kaeding 2019). However, increases in savings alone do not increase growth in the long run (Solow 1956). Instead, it increases the equilibrium of the capital stock, which increases output that contributes to economic growth (Solow 1956; Todaro and Smith 2017). The changes in output are tied to consumption, investment, and government expenditures. Furthermore, when consumption and investment are held equal, and government spending increases, output will also increase (Keynes 1936).

The level of output per worker varies from country to country and depends on the differences in the social infrastructure of each country (Hall and Jones 1999). The social infrastructure includes the institutions and government policies that facilitate the accumulation of skills, capital (both physical and human), invention, and technology transfer (Hall and Jones 1999). The economic infrastructure includes the building of and improvements to roads, electricity, water, sanitation, communications, and the like (Todaro and Smith 2017). This leads to the economic development of a society, which is the process of improving the quality and capabilities of all human lives by raising standards of living, self-esteem, and freedom (Todaro and Smith 2017).

### *Policy Implementation*

Policy implementation is defined as the execution of basic policy decisions (Cerna 2013). These decisions, as it relates to self-employment, include increases or decreases in self-employment tax, the lending interest rate, and government allocations from the small business administration to small businesses (Bryant, Hooper, and Mann 1993; Taylor 1993; Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019; Reynolds, Hay, Bygrave, Camp, and Autio 2000). The self-employment tax is the combination of social security, or old-age, survivor, and disability insurance, and medicaid, or hospital insurance (IRS 2023). This tax differs from wage employment tax because it does not include unemployment and disability benefits in the event of job loss (Dornbusch, Fisher, and Starz 2008; Baker, Égert, Fulop, and Mourougane 2018; Zwan, Hessels, and Rietveld 2018; Bureau of Labor Statistics 2022a). The interest rate is another policy that affects self-employment. While there are many types of interest rates (real, nominal, fixed, variable, compound, simple, etc.), the one that directly impacts self-employment is the lending interest rate, which includes short- and medium-term financing (The World Bank 2023).

The last policy implementation includes government allocations from the Small Business Administration (SBA). The SBA began in 1954 to provide funding to small businesses through programs like direct loans, loan guaranty, and venture capital to increase the businesses' opportunities in federal contracting, assistance during natural disasters, and to management and technical assistant for business formation and expansion (Dilger, Blackford, and Cilluffo 2022). The overall SBA allocations have varied from \$571.8 million in fiscal year (FY) 2007 to \$761.9 billion in FY 2020. The

fluctuation in total allocations depends highly on the amount needed for disaster relief and can affect the amount supplied to small businesses specifically (Dilger, Blackford, and Cilluffo 2022). Therefore, looking at just small business allocations the range is \$1.3 million in 2006 and 2007 to \$687.4 billion in 2020 (Dilger and Cilluffo 2022).

The U.S. Census Bureau utilizes the Business Dynamics Statistics (BDS) to assess and track business start-ups, the opening and closing of establishments, and the changes in the number of establishments and related jobs (Haltiwanger, Jarmin, and Miranda 2009). Start-ups specifically are tracked as a portion of the total private-sector employment and between 1980 and 2005 was estimated at 3%. The annual net employment growth of the private sector of the United States in the same timeframe was only 1.8%. This statistic provides evidence of the importance of start-up firms as it relates to new job opportunities (Haltiwanger, Jarmin, and Miranda 2009). However, the number of new start-ups and people entering the entrepreneurial cycle has continued to decline over time (Watson and Kaeding 2019). While there are many factors that could affect this decline, policy implementation as it relates to tax incentives, government allocations, and the interest rate, more specifically during times of economic hardships, are at the top of the list (Auerbach and Gorodnichenko 2013; Watson and Kaeding 2019; Krueger 2020).

*Tax policies.* A growing concern for the decline in entrepreneurship are tax policies that affect entrance to entrepreneurship based on risk, income potential and fixed costs (Watson and Kaeding 2019). For example, higher taxes on income, which includes the entrepreneur as a worker in the enterprise, increases the risk of starting a business (Watson and Kaeding 2019). This prompts entrepreneurs to circumvent these taxes by reclassifying themselves as self-employed contractors to avoid paying social security,

payroll tax or pension contributions, employment protection, and from following wage and hiring regulations (Baker, Égert, Fulop, and Mourougane 2018).

Another example of a decline in entrepreneurship is the reclassification of the self-employed to wage-employed in the United States beginning in 1967 (Becker 1984; Hipple 2004). This reclassification was based on the Current Population Survey (CPS) where individuals were asked if they were incorporated or unincorporated self-employed. Those who responded as incorporated were switched over to wage-employee status (Becker 1984; Hipple 2004). This switch occurred because the incorporated self-employed who owned the business were also paying themselves as a wage employee (Polivka and Miller 1998; Hipple 2004). This reframed the incorporated self-employed into the wages category. However, the CPS was reworked in 1994 and 2003 to be more inclusive of the questions asked as well as another reclassification of the self-employed back to the categories of incorporated and unincorporated (Hipple 2004).

*Government allocations.* Government spending, as it relates to self-employment and entrepreneurship, can be attributed to policy implementation (Reynolds, Hay, and Camp 1999). This is identified by the allocations to the small business administration and the subsequent tax incentives to self-employed businesses (Catalog of U.S. Government Publications 1996). Resource allocation through government policies, specifically in the start-up phase of the entrepreneurial cycle, provide initial means of support and an increase in the number of self-employed, which creates more job opportunities, and an overall sense of the contribution to the economic community (Zwan, Hessels, and Rietveld 2018).

Allocations from government entities will differ depending on the political party in office (Blinder and Watson 2014). There are two dominant political parties in the U.S.: Republicans and Democrats. The Republican party pushes policies for business owners, fights for lower taxes, believes in decreased government spending as it relates to intervening with the economy, and supports wages being regulated by a free market. For example, the Small Business Investment Act of 1958 was started under republican president, Dwight D. Eisenhower. The purpose of this Act was to invigorate the national economy by stimulating and supplementing private equity capital flow and long-term loan funds to expand, grow, and modernize the small business sector (Congress.gov 2023).

On the other hand, Democratic parties push for government intervention, encourage deficit spending during economic downturns, and believe in government regulation of wages (Blinder and Watson 2014). For example, the Small Business Jobs Act of 2010 was implemented under democratic president, Barack Obama. The purpose of the Small Business Lending Fund Program is to direct capital investments to eligible institutions to increase available credit for small businesses, and to provide tax incentives through the amendment of the Internal Revenue Code of 1986 (Congress.gov 2023).

While macroeconomic policy implementation is a controversial issue among these political actors, it is evident that the implementation of government policies can have a drastic effect on self-employment and the entrepreneurial system (Hibbs 1977; Akard 1992; Reynolds, Hay, Bygrave, Camp, and Autio 2000; Hipple 2004; Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019).

*The interest rate.* There are many types of interest rates (real, nominal, fixed, variable, compound, simple, etc.). However, the one that directly impacts self-employment is the lending interest rate, which is the bank rate that includes short- and medium-term financing specifically in the private sector (The World Bank 2023). The interest rate has been used as a policy tactic to combat inflation and cool the economy (Taylor 1993). This tactic is used to help maintain the precedent set forth by Congress to maximize employment, sustain low and stable inflation, and to have moderate long-term interest rates (Board of Governors of the Federal Reserve System 2016). For example, Bryant, Hooper, and Mann (1993) compared nine multi-country econometric models using the interest rate as a policy rule. This study assumed that interest rates were adjusted to respond to deviations in the money supply, deviations in the exchange rates, or as a weighted deviation of inflation. The study found that while each model differed, they all proved that utilizing the interest rate as a means of policy implementation was the most effective tactic (Taylor 1993).

The interest rate, which has been described as the link between income and capital, is the amount of liquidity an individual is unwilling to part with control over for a given amount of time (Keynes 1936). Fisher (1930) adds that it is the percentage of premium paid on money on one day to have that money back in hand on a future date. Therefore, it is the price of the equilibrium between the desire to hold money in the form of cash with the available amount of cash (Keynes 1936).

The desire to hold money is also known as the demand for money, and it increases as income increases and decreases with the interest rate (Akerlof and Shiller 2009). This provides an inverse relationship between the interest rate and the demand for money, or

inflation (Taylor 1993). For example, when wages increase, the demand for money increases, which causes interest rates to decrease (Evans and Leighton 1989; Akerlof and Shiller 2009). Lower interest rates encourage business owners to borrow money for investments in expanding their business, purchasing equipment, or hiring more workers. However, higher interest rates deter business owners and consumers from borrowing money (Evans and Leighton 1989; Board of Governors of the Federal Reserve System 2016).

## Data and Methods

### *Data - Variables*

This study focuses on the United States in a country-level study to provide a foundation of factors in the self-employment process. The dependent variable is the percentage of self-employed people in the working age population (15-64). The factors, or independent variables, include the lag of self-employment ( $SE_{t-1}$ ), the demographic markers of *Race*, *Gender*, and *Age*, and policy implementation (*PI*), shocks to the economy (*Shocks*), private sector employment (*PS*), the unemployment rate (*UE*), income (*I*), and the political party (*PP*).

The lag of self-employment ( $SE_{t-1}$ ) is included to determine if the model is an autoregressive [AR(1)] model. An AR(1) model is a weakly dependent series where nothing beyond the last period affects the dependent variable (Wooldridge 2019). *Race* is operationalized by use of the  $white_t$  category to determine if white people continue to be the most likely to enter self-employment (Rissman 2003; Nikolova and Bargar 2010; Hipple and Hammond 2016). The variable is calculated as a percent of the number of people in the workforce that are white divided by the total workforce (U.S. Facts 2022).



$Gen_t$  is included to identify if males are still more likely to enter self-employment than females (Noorderhaven et al. 1999; Rissman 2003; Fairlie 2005; Nikolova and Bargar 2010; Dvouletý and Lukeš 2016).  $Age_{it}$  includes six age categories (16-19, 20-24, 25-34, 35-44, 45-54, and 55-64) and is used to determine if the older category, those close to or in retirement age, are still most likely to enter self-employment (Earle and Sakova 2000; Rissman 2003; Nikolova and Bargar 2010; Dvouletý and Lukeš 2016). Private sector employment ( $PS_t$ ) is included to determine if there continues to be a higher percentage of self-employed people coming from the private industry (Mayer 2014).

Funds allocated to the small business administration ( $SBA_t$ ), the self-employed income tax rate ( $Tax_t$ ), and lending interest rate ( $IR_t$ ) are included as proxies for policy implementation. ( $SBA_t$ ) is the outlay total for each year in the United States budget (U.S. Government Publishing Office 2022). The rationale is that the more resources allocated in the start-up phase, the more likely the self-employed will be to continue and maintain their businesses (Watson and Kaeding 2019; Freedström, Peltonen, and Wincent 2021). Therefore, there should be a positive relationship between  $SBA$  and self-employment. However, the more money the self-employed make, the higher the tax they will pay on their income (Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019). This should lead to an inverse relationship between the tax rate and self-employment. The Board of Governors of the Federal Reserve System (2016) state that higher lending interest rates deter people from borrowing money. Therefore, the lending interest rate ( $IR_t$ ) is included to determine if an inverse relationship exists between the lending interest rate and self-employment (Auerbach and Gorodnichenko 2013; Watson and Kaeding 2019; Krueger 2020). The political party,  $PP_t$  is included to determine if the

political party in office (republican or democrat) causes a change in self-employment numbers. The Republican party is identified as 1 and Democratic party as 0. Moreover, income ( $I_t$ ) is included to determine if those who have a higher income are still those who are more likely to enter self-employment (Watson and Kaeding 2019; OECD 2022b).

A year is identified as a *shock* year if the unemployment rate from the previous year decreases by one standard deviation (1.59%) or higher. This is additionally verified by a one standard deviation (2.10%) of the difference in GDP per capita growth from year to year. The  $Shocks_t$  variable is identified as an indicator variable with (1) meaning there was a shock in that year and (0) otherwise. Four years meet the shock qualifications: 1975 (y75) with an unemployment rate of 8.48%, 1982 (y82) with an unemployment rate of 9.71%, 2009 (y09) with an unemployment rate of 9.28%, and 2020 (y20) with an unemployment rate of 8.09%. These variables are included separately and interacted with other variables to determine if a negative economic shock to the economy affects the decision to enter self-employment.

Additionally, the unemployment rate is used because it is a lagged indicator of economic shocks (Shapiro and Stiglitz 1984). Therefore, the previous year's unemployment rate, ( $UE_{t-1}$ ), is used to determine if the previous year's unemployment rate influences entrance into self-employment. The current year's unemployment rate ( $UE_t$ ) is also included to determine the relationship between self-employment and unemployment in real time. In both the ( $UE_t$ ) and ( $UE_{t-1}$ ) variables, if the coefficient is positive, then there is a refugee-push into self-employment and if the coefficient is

negative then there is a propensity-pull into self-employment (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012).

### *Methods*

This essay utilizes economic data from the World Bank (2022), U.S. Bureau of Labor Statistics (2022b, 2022c) from 1962 to 2019, U.S. Census (2022a, 2022b, 2022c, 2023a) data from 1967 to 2021, U.S. Facts (2022), Encyclopaedia Britannica (2023), Bradford Tax Institute (2023), and the Organization for Economic Co-operation and Development (OECD 2022a, 2022b, 2022c, 2022d, 2022e) to analyze the potential long-term effect of economic factors on the decision to enter self-employment in the United States. This analysis includes a time series analysis, which compares variables at successive, equally spaced intervals of time (Barro 1997). The key feature to time series analysis is that the data is rarely independent of each other due to the influence of future events and lags in behavior (Wooldridge 2019). However, there are some time-constant variables that do not change over time (i.e., gender and race) (Wooldridge 2019). The method of ordinary least squares (OLS) estimates from the finite distributed lag model, which includes one or more variables that affect the dependent variable with a lag, is used (Wooldridge 2019). The following model includes independent variables across multiple panels within a variable, signified by (*i*), and time, signified by (*t*), The following model is used to assess self-employment,

$$SE_t = \beta_0 + \beta_1 SE_{t-1} + \beta_2 Race_t + \beta_3 Gen_t + \beta_4 Age_{it} + \beta_5 SBA_t + \beta_6 Tax_t + \beta_7 UE_t + \beta_8 UE_{t-1} + \beta_9 IR_t + \beta_{10} PS_t + \beta_{11} I_{it} + \beta_{12} PP_t + \beta_{13} Shocks_{it} + \varepsilon. \quad (1)$$

$SE_{t-1}$  is included to determine if there is continuance in self-employment from the previous year,  $Race_t$  is the percentage of white people in a given year,  $Gender_t$  is the

percentage of males in a given year,  $Age_{it}$  is the percentage of people in one of the age categories (16-19, 20-24, 25-34, 35-44, 45-54, or 55-64) in a given year,  $SBA_t$  is the allocation of funds to self-employment programs from the small business administration in a given year,  $Tax_t$  is the policies related to taxes the self-employed pay in a given year,  $UE_{t-1}$  is the previous year's unemployment rate,  $IR_t$  is the interest rate in a given year,  $PS_t$  is the percentage of people employed in the private sector in a given year,  $I_{it}$  is a percent of those in one of the income levels (lower 20th, lower 40th, 60th, upper 40th, and upper 20th percentiles) in a given year,  $UE_t$  is the current year's unemployment rate,  $PP_t$  is the political party representation in a given year, and  $Shocks_{it}$  are included as indicator variables for a shock to the economy in that specific year. This model is utilized to formulate the following hypotheses:

$H_0$ : Increases in small business administration allocations will not affect self-employment.

$H_1$ : Increases in small business administration allocations will positively affect self-employment.

$H_0$ : Tax rates will not affect self-employment.

$H_2$ : Tax rates will negatively affect self-employment.

$H_0$ : Shocks to the economy will not affect self-employment.

$H_3$ : Shocks to the economy will positively affect self-employment.

$H_0$ : Interest rates will have a positive effect on self-employment.

$H_4$ : Interest rates will have an inverse relationship with self-employment.

## Analysis and Results

The regression model is tested for goodness of fit, normality, homoscedasticity, randomness, autoregressive qualities (i.e., is the model an AR(1) or AR(2), is there a unit root yielding I(1) or is the model I(0), and if there is a unit root, does it take a random walk or drift), is detrended with the addition of a year variable, and includes a quadratic of the year to determine if self-employment is increasing or decreasing over time. The Kolmogorov-Smirnoff normality test yields a p-value high enough to confirm normality of the data. The Heteroskedasticity test and White's test confirm that the model is homoscedastic and that there is constant variance. The Wald-Wolfowitz Runs test was performed and concluded that the dependent variable is random, but not regarding the mean or median. This means that there is a negative serial correlation between yearly self-employment numbers. Therefore, self-employment numbers that are higher than the mean or median in one year are then followed by numbers that are lower and vice versa in the next (Naghshpour 2016).

The model follows an autoregressive model of order 1, AR(1), which means that nothing passed the first lag, both with unemployment and the interest rate and the lag of the dependent variable in an individual test, affects this model. This means that there is a short-term relationship between unemployment and self-employment and the interest rate and self-employment. The Dickey-Fuller unit root test rejects the null of a unit root and classifies the model as I(0). This means that the model includes a weakly dependent process, and nothing needs to be done to use the data (Wooldridge 2019). However, since the model is categorized as I(0), a time variable will need to be added to account for trending behavior in the variables and to detrend the data. Additionally, the Rho value in

the augmented Dickey-Fuller test equals 0.93, which is very close to but not equal to 1.

This means that the errors are consistent, and the variance gets smaller as the population grows (Wooldridge 2019).

Table 1.1 includes the descriptive statistics for all potential variables in the models, including interaction variables.

Table 1.1

Descriptive Statistics for variables

Variable	Observation	Mean	Std. Dev.	Minimum	Maximum
selfempl	59	8.827	2.061	6.11	15.26
unempl	62	5.991	1.59	3.49	9.71
private	51	83.182	1.044	80.77	85.02
IncomeL20	55	3.702	.434	2.9	4.4
IncomeL40	55	9.338	.902	8	11.1
Income60	55	15.591	1.165	13.9	17.5
IncomeU40	55	23.784	.763	22.6	25
IncomeU20	55	47.609	3.214	42.8	52.7
Shocks	61	.066	.25	0	1
TaxRate	60	11.998	3.81	4.7	15.3
PolParty	62	.548	.502	0	1
InterestRate	62	7.032	3.262	3.25	18.87
Male	59	62.591	9.5	45.47	74.7
white	56	21.394	2.551	17.07	25
SBA	60	.229	.195	.001	.743
Age1619	62	6.357	1.971	3.57	9.65
Age2024	62	11.454	1.941	9.02	15.03
Age2534	62	23.685	3.131	19.08	29.39
Age3544	62	22.484	2.781	18.01	27.38
Age4554	62	19.706	2.684	14.98	23.49
Age5564	62	12.558	2.512	8.94	16.98
time	62	31.5	18.042	1	62
time2	62	1312.5	1172.705	1	3844

†Observation is the number of observations, which is also the number of years.

†Mean is the mean of the data over the number of years.

†Std. Dev. is the standard deviation of the data.

†Min and Max are the minimum and maximum values of the data.

Table 1.2 provides five regression models including: the basic model (1), the year variable is added in model (2) to detrend the data, model (3) includes a quadratic year variable to identify if there was an increase or decrease in self-employment over time, model (4) includes interaction variables between SBA and the political party and male gender, and model (5) excludes the income categories to determine if funding from the small business administration is more significant than an individual's current income status. The regression models' outputs indicate that the models are good with an  $R^2$  ranging from 99.4% to 99.6% and a constant joint f-statistic of 0.000.

Table 1.2

Time Series Regression models

	(1) selfempl	(2) selfempl	(3) selfempl	(4) selfempl	(5) selfempl
L.selfempl	.484***	.4**	.466**	.393**	.339**
	(.157)	(.191)	(.189)	(.168)	(.161)
unempl	-.081	-.101	-.091	-.036	-.181**
	(.082)	(.087)	(.085)	(.084)	(.07)
private	-.453***	-.473***	-.422**	-.368*	-.636***
	(.156)	(.159)	(.158)	(.191)	(.169)
TaxRate	-.057	-.046	-.04	-.048	-.082*
	(.05)	(.053)	(.051)	(.046)	(.043)
InterestRate	.039*	.036*	.031	.05**	.056***
	(.02)	(.02)	(.02)	(.022)	(.02)
SBA	.003	.001	.052	4.56**	-.176
	(.308)	(.31)	(.303)	(2.038)	(.297)
Shocks	.184	.2	.182	.11	.27*
	(.179)	(.182)	(.177)	(.157)	(.135)
Age2534	.219	.061	-.305	-.578*	-.435
	(.199)	(.283)	(.356)	(.324)	(.325)
Age4554	.159	-.02	-.362	-.609*	-.493
	(.183)	(.292)	(.354)	(.321)	(.328)
time		-.073	.166	.321*	.167
		(.093)	(.173)	(.159)	(.149)
time2			-.003	-.005**	-.003*
			(.002)	(.002)	(.002)
MaleSBA				-.077**	

Table 1.2 (continued)

				(.032)	
_cons	15.16	30.089	35.268	53.295	86.768***
	(40.584)	(45.036)	(43.817)	(39.198)	(29.583)
Observations	50	50	50	50	50
R-squared	.994	.994	.995	.996	.995

Note: Additional variables included in the study that were not significant: L.unempl, male, white, IncomeL20, IncomeL40, Income60, IncomeU40, IncomeU20, PolParty, Age1619, Age2024, Age3544, Age5564, and PPSBA.

Note: Standard errors are in parentheses \* $p < .1$ ; \*\* $p < .05$ ; \*\*\* $p < .01$

The significant variables in model (1) are the lag of self-employment, private sector employment, and the interest rate. The lag of self-employment has a coefficient of 0.484, indicating that when the previous year's self-employment rate increases by one unit, the current year increases by 48.4%. The private variable has a coefficient of -0.053, meaning that when the private sector employment increases by one unit, self-employment will decrease by 5.3%. The interest rate variable has a coefficient of 0.039, which means that when the interest rate increases by one unit, there is a 3.9% increase in self-employment.

When the time variable was added in model (2) and the data was detrended there was only a slight change in the coefficients of the currently significant variables, however, nothing else changed in the model. The time variable, while not a jointly significant variable, has a coefficient of -.073, indicating self-employment will decrease by 7.3% year over year, which is consistent with the literature (Evans and Leighton 1989; GERA 2023). It is noted that the individual regression model using time as the independent variable is significant and yields a coefficient of -0.109, indicating that, ceteris paribus, there is a 10.9% decrease in self-employment year over year.

Model (3) includes a quadratic time variable to determine if there is a rising or falling over time. The variable itself was not jointly significant, however, the coefficient



of -0.003 indicates a fall of 0.3%, albeit very small, in self-employment over time, which is consistent with the data. Adding the quadratic variable increased the  $R^2$  from 99.4% to 99.5%, changed the coefficient of the lag of self-employment and the private sector, and the interest rate variable is no longer significant. It is also noted that the individual regression model using *time2* as the independent variable is significant and yields a coefficient of -0.002, indicating that there is a 0.2% decrease in self-employment over time.

Model (4) includes the interaction variables between the SBA and political party and SBA and the male gender. Adding these terms provides perspective on the possibility of a change in the political party affecting the government allocations to the small business administration (SBA) and if the allocations to the SBA are affected by gender. Adding these two variables resulted in the lag of self-employment, private sector employment, interest rate, *SBA*, *Age2534*, *Age4554*, *time*, *time2*, and *MaleSBA* as significant variables. The lag of self-employment and private sector variables decrease slightly in the coefficients, but their signs and impact are roughly the same. The interest rate is significant again with a coefficient of 0.05 indicating that when the interest rate increases by 1%, self-employment will increase by 5%. The *SBA* variable has a coefficient of 4.56, which is beyond the -1 to 1 threshold. This means that when allocations from the SBA increase one unit (one billion dollars) above the long-run trend, then self-employment will increase by about 4.56%. *Age2534* has a negative coefficient of -0.578 indicating that when the *Age2534* category increases by one unit, self-employment will decrease by 57.8%. *Age4554* has a negative coefficient of -0.609 indicating that when the *Age4554* category increases by one unit, self-employment will

decrease by 61%. The time variable has a positive coefficient of 0.321 meaning that self-employment increases by 32.1% year over year. However, time2 has a negative coefficient of -0.005 indicating that self-employment decreases by 0.5% over time.

The *MaleSBA* variable has a coefficient of -0.077 meaning that when allocations from the SBA to male self-employed increases by one unit (one billion), then self-employment will decrease by 7.7%. This decrease could be due to increases over time in women's programs provided by the SBA like the Women's Business Center (WBC) Renewable Grant Program. This program was initially established by P.L. 100-533, which is the Women's Business Ownership Act of 1988, and was the Women's Business Demonstration Pilot Program. Through this act, the SBA provides financial assistance to private, nonprofit organizations. Their goals are to conduct demonstration projects providing financial, management, and marketing assistance to small businesses. This includes start-up businesses, owned, and controlled by women (Congressional Research Service 2022).

The exclusion of the income variables in model (5) yielded the lag of self-employment, unemployment, private, tax rate, interest rate, shocks, and the time quadratic variables as significant. Controlling income highlights SBA as a necessary resource. The coefficient of the lag of self-employment decreased from 0.393 to 0.339, means that a one unit increase in self-employment in the previous year increases self-employment in the current year by 33.9%.; indicating progression in the entrepreneurial cycle (Bosma et al. 2008; Bosma et al. 2021). Unemployment has a coefficient of -.181, indicating that there is an inverse, or negative relationship, between unemployment and self-employment. Meaning that when unemployment increases by one percent, self-

employment will decrease by 18.1%. This indicates that the motivation to enter self-employment is consistent with the propensity-pull hypothesis (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; OECD 2022). The private sector variable has a coefficient of -0.636 meaning that when the private sector employment increases by one unit, then self-employment will decrease by 63.6%. This could be due to private sector employment providing an opportunity for more promotions and higher pay (Bureau of Labor Statistics 2022d).

The tax rate has a negative coefficient of -0.082 indicating that when the tax rate increases by one percent, self-employment will decrease by 8.2%. Increases in taxes on income increase the risk of starting a business and prompts business owners to reclassify to avoid these taxes (Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019). The interest rate has a coefficient of 0.056 meaning that when the interest rate increases by one percent then self-employment will increase by 5.6%. The shock variable has a coefficient of 0.27 indicating that when it is a shock year self-employment will increase by 27%. When the coefficient is positive, then there is a refugee-push into self-employment (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012). The time quadratic has a coefficient of -0.003 indicating that self-employment will decrease by .3% over time.

### *Hypotheses*

Hypothesis 1 states that an increase in small business administration allocations will positively affect self-employment. The *SBA* variable was not significant in models 1, 2, 3 and 5. Models 1 through 4 had positive coefficients (.003, .001, .052, and 4.56) while model 5 provided a negative coefficient (-0.176). There are mixed outcomes of the

effects of the *SBA* variable on self-employment, which continues when *SBA* interacts with both the political party (0.19 and 0.527) and male (-0.077) categories. Therefore, we fail to reject the null for hypothesis 1 and say that the small business administration allocations do not affect entrance into self-employment.

Hypothesis 2 states that tax rates will negatively affect self-employment. While the variable was only significant in model (5), the coefficient was negative in all 5 models (-0.057, -0.46, -.04, -0.48, and -0.082). This means that we can reject the null for hypothesis 2 and confirm that increasing the tax rate does negatively affect entrance into self-employment.

Hypothesis 3 states that shocks to the economy will positively affect self-employment. While the *Shocks* variable was only significant in model 5, it was positive in all 5 models (0.0184, 0.2, 0.182, 0.11, and 0.27). In the years that are identified as having an economic shock (1975, 1982, 2009, and 2020) there is a positive relationship with self-employment. This positive relationship means that people are entering self-employment during shock years out of necessity (Meager 1992; Congregado, Golpe, and van Stel 2012; Eliasson and Westlund 2013). Therefore, we can reject the null for hypothesis 3 and state that in times of economic hardship, self-employment does increase.

Hypothesis 4 states that interest rates will have an inverse relationship with self-employment, which is consistent with the literature (Evans and Leighton 1989; Board of Governors of the Federal Reserve System 2016). The interest rate was significant in models 1, 2, 4, and 5 and had positive coefficients in all 5 models (0.039, 0.036, 0.319, 0.05, and 0.05). This means that we fail to reject the null and state that there is a positive

relationship between self-employment and the interest rate. While not consistent with the literature, this positive relationship between the interest rate and self-employment is feasible. For example, the interest rate is utilized as a policy tactic to combat inflation. This means that as interest rates increase, hourly wage employees' income will decrease (Evans and Leighton 1989; Taylor 1993; Akerlof and Shiller 2009). This decrease on the wage side of employment could push people to seek alternative options of employment (i.e., self-employment). Therefore, as the interest rate increases, so will self-employment.

### Conclusion

This essay utilized time series data to determine the mechanisms that affect self-employment in the United States. Previous literature determines that the typical self-employed are white males close to retirement age with access to income (Meager 1992; Noorderhaven et al. 1999; Rissman 2003; Hipple 2004; Dvouletý and Lukeš. 2016; Moulton and Scott 2016; Baker, Égert, Fulop, and Mourougane 2018). However, while this study found that people who enter self-employment are still older, they include races other than white, don't require individual income to succeed, are increasingly female, rely on other means of income (i.e., SBA allocations), have an inverse relationship with the private sector of employment, are motivated by the opportunity self-employment provides, and are minimally deterred by tax and interest rates.

Those aged 25 to 34 and 45 to 54 have the greatest significant impact on entrance into self-employment, albeit a negative one. While the 45-54 category is closer to retirement age, the 25-34 category is not. Over time, the 55-64 age category has the greatest positive effect on self-employment, however, that variable is not significant in any of the models. In the US it is more likely for older people to be self-employed as that

age category includes more people due to the baby boomer era (Evans and Leighton 1989; Nikolova and Bargar 2010). Additionally, being white was not significant in this study, which is consistent with Kelley et. al.'s (2022) findings. The race demographic of the United States is constantly changing with more black and Hispanic people entering the self-employment workforce (Kelley et. al. 2022).

It was found that the income variable provided mixed reviews. While the income levels were not significant in any of the models, it was consistently positive for the upper 20th percentile level of income (0.077, 0.074, 0.282, and 0.28). This is consistent with the literature that having more resources does increase the chances of people entering self-employment (Noorderhaven et al. 1999; Rissman 2003; Fairlie 2005; Nikolova and Bargar 2010; Dvouletý and Lukeš 2016). The negative relationship between self-employment and income in the first two models of the lowest 20 percentile income level and models 3 and 4 in the middle-income level could be due to increases in environmental shocks. For example, funds allocated to business start-up is typically from savings and current income. Therefore, when stock markets crash, like during the 2007-2008 financial crisis, it is likely that investments into new business ventures declined (Bosma and Levie 2009). This decrease in potential investments prompts the need for additional funding. Thus, in models 1 through 4 that include both income and SBA, there is a positive relationship between SBA and self-employment (0.003, 0.001, 0.052, 4.56, and -0.176). The decline in usage of individual income during times of crisis increases the need for additional funding, therefore justifying the need for small business allocations (Dilger, Blackford, and Cilluffo 2022).

The inclusion of the year variable to detrend the data provided evidence that self-employment is not decreasing in the short-term. Time was a variable in models 2 through 5 and was only negative in model 2 (-0.073). Models 3, 4, and 5 were positive (0.166, 0.321, and 0.167) with model 4 being a significant variable. This indicates that year over year, self-employment is increasing. However, when the quadratic of the time variable was added, there was a consistent negative relationship between  $time^2$  (-0.003, -0.005, -0.003) and self-employment. This decrease, albeit it a small one and arguably could be zero with no effect at all, in overall self-employment numbers in the long run could be attributed to the progression through the entrepreneurial cycle, from nascent self-employed to established business owner (Schneider 1997; Cullen, Johnson, and Parboteeah 2014; Reynolds, Hay, and Camp 1999; Center for American Entrepreneurship 2022). The self-employment data used was a cumulative of the inflow and outflow of the self-employed. The outflow could be attributed to movement to unemployment or progression in the entrepreneurial process to established business owners (Meager 1992; Schneider 1997; Cullen, Johnson, and Parboteeah 2014; Reynolds, Hay, Bygrave, Camp, and Autio 2000; Center for American Entrepreneurship 2022).

Private sector employment has a consistently significant negative effect on self-employment across all 5 models (-0.453, -0.473, -0.422, -0.368, and -0.636). This means that when private sector employment decreases, self-employment will increase and vice versa. This finding is consistent with the literature, specifically in more recent years after the economic shock of the COVID-19 pandemic. A time known as the Great Resignation saw a decrease of 4 million private sector workers a month from August 2021 to March 2022 (Bureau of Labor Statistics 2023b). This finding is consistent with data from other

time periods after an identified shock to the economy. For example, in each shock year (75, 82, 09, and 20) private sector employment decreased in the shock year and then increased in the year(s) after. Additionally, in all four shock years, self-employment rates increased during the shock year and then subsequently decreased after. This is consistent with the inverse relationship and provides evidence that economic shocks play a role in decisions to enter self-employment.

The motivating factor to enter self-employment is identified in the unemployment variable, which had a consistent negative, inverse, relationship with self-employment in all five models (-0.081, -0.101, -0.036, and -0.181). This negative relationship is consistent with the propensity-pull hypothesis that entrance into self-employment is due to the opportunity to make more money (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012). This is also consistent with economies that are developed and innovation-driven, like the United States (GERA 2018).

However, there are still potential deterrents for entrance into self-employment, including the lending interest rate and self-employment tax rate. In this study, the lending interest rate was consistently positive (0.039, 0.036, 0.031, 0.05, and 0.056) and significant in four of five models (1, 2, 4, and 5) while the self-employed tax rate was consistently negative (-0.057, -0.046, -0.04, -0.048, and -0.082) and only significant in model 5. The relationship between the tax rate and self-employment is consistent with the literature in that there is a negative, or inverse, relationship. For example, the more money a self-employed individual makes, the higher the tax they will pay on their income (Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019). Additionally,



the higher taxes are on income, which includes the entrepreneur as a worker in the enterprise, the higher the risk of starting a business (Watson and Kaeding 2019).

However, the lending interest rate and self-employment have a positive relationship in this study, indicating that when the interest rate increases so does self-employment. The literature states that the higher interest rates are, the more likely they will deter people from borrowing money, prompting an inverse relationship between the interest rate and self-employment (Evans and Leighton 1989; Board of Governors of the Federal Reserve System 2016). While the findings in this study are not consistent with the literature, the positive relationship between the interest rate and self-employment is feasible. For example, the interest rate is utilized as a policy tactic to combat inflation. This means that as interest rates increase, hourly wage employees' income will decrease (Evans and Leighton 1989; Taylor 1993; Akerlof and Shiller 2009). This decrease on the wage side of employment could push people to seek alternative options of employment (i.e., self-employment). Therefore, as the interest rate increases, so will self-employment.

It is noted that there are limitations to this study, which includes the omission of significant variables due to lack of data. One such variable is educational attainment, which usually has a negative, or inverse, relationship with self-employment (Earle and Sakova 2000; Nikolova and Bargar 2010; Borjas 2013; Dvouletý and Lukeš 2016; Hipple and Hammond 2016). The self-employed exist at all levels of educational attainment (Hipple and Hammond 2016). It is noted that for men, the higher their educational background, the more likely they are to be self-employed. On the other hand, for women, the higher their educational background, the less likely they are to enter self-employment, however, women are more likely to maintain businesses through to established business

ownership (Hill et. al. 2023). The data for this variable was only available from 1981 forward and, thus, was left out due to the lack of sufficient data for the study.

Another significant variable that was left out is immigration, which usually has a positive effect on self-employment (Earle and Sakova 2000; Nikolova and Bargar 2010; Borjas 2013; Dvouletý and Lukeš 2016; Hipple and Hammond 2016). For example, specifically in the unincorporated category of self-employment, foreign-born workers were more likely than U.S. native-born workers to be self-employed in 2015 (Hipple and Hammond 2016). This variable was not included due to non-consecutive data as it was only tracked every ten years until 2005.

Last, the study includes aggregate data on the U.S. and is not divided by region, state, or individual. This means that the study is looking at the self-employed, not on an individual level, which could cause different results. For example, if a specific region or state were studied on an individual level, a probit analysis between male and female, or age categories could have been assessed. This level of analysis could provide a micro-level view of self-employment needs from an individual perspective.

## CHAPTER III – ESSAY 2: DO SHOCKS AFFECT SELF-EMPLOYMENT

### Introduction

This essay utilizes the method of ordinary least squares (OLS) estimates and a comparative analysis between the United States and United Kingdom to assess the factors that affect self-employment after an economic shock. Self-employment is described as an employer, an individual that works for themselves, members of producers' co-operatives, and unpaid family workers (Holloway and Pimlott-Wilson 2021; OECD 2022d). Self-employment is recognized as the start-up phase of the entrepreneurial business cycle and is commonly identified as a cyclical relationship that depends on the state of the economy when the decision to move to self-employment is made (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018). Therefore, self-employment is both a survival strategy when there is not an alternative income available and is evidence of an entrepreneurial desire to be one's own boss (OECD 2022d).

The OLS estimates analysis will further Nigel Meager's (1992) article, *Does Unemployment Lead to Self-Employment*, which analyzed the inflow to and outflows from self-employment to determine whether the relationship between self-employment and unemployment is pro- or counter-cyclical. A pro-cyclical relationship suggests a positive relationship between self-employment and unemployment. This means that unemployment pushes people into self-employment (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018). Therefore, if unemployment is high, then self-employment will be high (Meager 1992). A counter-cyclical relationship suggests a

negative relationship between self-employment and unemployment (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018). This means that high economic activity pulls people into self-employment, thereby decreasing unemployment (Meager 1992). Therefore, there is an inverse relationship meaning if self-employment is high then unemployment is low and vice versa (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018).

This analysis includes individual assessments of the United Kingdom and the United States, and a combined panel model. These models start with Meager's (1992) original variables of self-employment as the dependent variable and unemployment, non-agricultural employment, and the gross domestic product per capita growth (GDPPCG) as the independent variables. Then, the independent variables of lag of self-employment, lag of unemployment, the lending interest rate, political party, employment, and shocks to the economy are added. A comparative analysis between the United States and the United Kingdom is provided to assist the assessment of factors that affect self-employment, specifically during times of economic crisis.

This study found that there was a structural change in the motivation to enter self-employment in the United Kingdom. The interaction variables (y81unempl, y93unempl, y09unempl, and y20unempl) provided opposite coefficient signs, indicating a change from a push into self-employment (positive coefficient) to a pull into self-employment (negative coefficient). The United States showed no structural change in any of the shock years (y75 y82, y09, and y20), and they all had positive coefficients, indicating a push

into self-employment. The combined panel model yields positive coefficients for y75, y82, y09, and y20, which indicates a refugee-push, and negative coefficients for y81 and y93, which shows a propensity-pull into self-employment.

It is noted that there are limitations to this study, which includes the omission of significant variables due to the lack of data and/or access to the data. For example, in the United Kingdom, the self-employment tax rate and government allocation for small and medium sized enterprises (SMEs) could provide a more robust perspective of how policy implementation plays a role in the motivation to self-employment (Hibbs 1977; Akard 1992; Reynolds, Hay, and Camp 1999; Hipple 2004; Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019). Additionally, including specific data on inflows to and outflows from self-employment, as well as income data and how it can affect inflow and outflows can provide a narrower view of if people are exiting self-employment due to business closure or progression to entrepreneurship (Meager 1992; Taylor 2001).

## Literature Review

### *Self-employment*

Self-employment is known to significantly contribute to economic growth in many countries (OECD 2000; Brown and Lee 2017). The self-employed are described as an employer, an individual that works for themselves, members of producers' co-operatives, and unpaid family workers (OECD 2022d). More specifically, the self-employed are identified as those who are solo self-employed without employees and, self-employment is described as the start-up phase of the business cycle towards entrepreneurship (Dvouletý and Lukeš 2016; Holloway and Pimlott-Wilson 2021).

Therefore, self-employment is both a survival strategy when there is not an alternative income available, or as evidence of an entrepreneurial desire to be one's own boss (OECD 2022d). The former prompts relationship studies between self-employment and unemployment, while the latter is indicative of a relationship between self-employment and entrepreneurship (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Congregado and Golpe 2011; Horta, Meoli, and Vismara 2015; Baker, Égert, Fulop, and Mourougane 2018).

### *The United Kingdom*

In the United Kingdom, the self-employed are referred to as those who own and operate small and medium sized businesses (SMEs) (OECD 1997; Brown and Lee 2017). SMEs are businesses that employ from zero (solo self-employed) to 249 employees (Hutton 2022). There are about 5.5 million SMEs in the UK, and they account for roughly 60% of UK businesses and about 50% of the private sector's revenue (Brown and Lee 2017; Hutton 2022). SMEs account for up to 99.9% of the UK business population, as well as for large shares of employment and turnover (British Business Bank 2022; Hutton 2022). While men still dominate the SME category of employment, women owned SMEs are growing faster than the economy as a whole (OECD 1997; Brown and Lee 2017; Hutton 2022). However, despite the contribution to the economy, SME business owners still struggle with start-up financing (Abraham and Schmukler 2017; Brown and Lee 2017). This prompts the need for government implemented programs that support SMEs, which inevitably supports the UK economy (OECD 2017; Abraham and Schmukler 2017; Brown and Lee 2017; Hutton 2017).

Self-employment data in the United Kingdom has been collected since the early 1970s through the British Household Panel Survey (BHPS), which consists of panel data on roughly 5,500 households and 10,000 individuals (Taylor 2004). Over the last 50 years, self-employment in the United Kingdom experienced significant growth from the 1970s through the 1980s and into the early 1990s when it began to decline and then surged again in the mid-2000s (Taylor 2004; Office for National Statistics 2014). This growth is attributed to government policy implementation, decreases in employed wage workers, an increase in the age of the self-employed, and an increase in self-employed women (Office for National Statistics 2014).

First, strategic government policy implementations like the Enterprise Allowance Scheme (EAS) in the early 1980s, the Inland Revenue initiative in 1996, and the New Enterprise Allowance program set up in 2011 impacted both the inflow to and outflow from self-employment (Taylor 2001; Taylor 2004; Office for National Statistics 2014). For example, the EAS was set up to provide those who are unemployed with £40 (\$172.80) a week incentive if they entered self-employment (Office for National Statistics 2014). However, in 1996, the Inland Revenue introduced an initiative for the self-employed to self-assess their earnings. This potentially led to an increase in revenue loss in taxes due to non-reporting (Parliamentary Business 2002). On the other hand, the New Enterprise Allowance program offers £65 a week, which is between \$108.65 in 2011 to \$80.23 in 2023, to those who want to start their own business (Bright Knowledge 2023; Independent News and Data Provider 2023).

Second, decreases in the manufacturing sector, which prompted an increase in contracting work and movement to the service sector, also contributed to the increase in

self-employment activity (Meager 1992; OECD 1997; Office for National Statistics 2014). For example, the GEM (2001) national report discusses that the opportunity for entrepreneurship is higher when there is less manufacturing in the economy. This coincides with an increase in the service sector, specifically business services (Harding 2002). Kelley, Bosma, and Amorós (2010) discuss that the proportion of entrepreneurial activity can be divided into industry sectors: extraction businesses (farming, forestry, fishing, and mining) are dominant in the factor-driven economies, business services are common in innovation-driven economies, but transforming businesses (manufacturing and construction) are equally present in all economic levels. Thus, the movement from manufacturing to business services is marked as the development phase of an economy (Kelley, Bosma, and Amorós 2010).

Third, it is noted that the increase in self-employment as of the mid-2000s forward can be attributed to the increase in people working past pension/retirement age. For example, people over 65 that are self-employed doubled from 214,000 in 2009 to 428,000 in 2014 (Office for National Statistics 2014). Additionally, the participation entrance rate of people in the 55-64 age range increased from about 5.8 percent in 2002 to 7.4 percent in 2022 (Hart and Levie 2010; Hart et. al. 2022). However, while the category itself increased in size and entrance rates increased over the course of the GEM reports, this age group is still not the leader in entrance to self-employment (Kelley, Bosma, and Amorós 2010; Hart et. al. 2022).

Last, although men still dominate the self-employment industry, the number of women in self-employment is increasing at a faster rate than men (Office for National Statistics 2014; Hutton 2017; British Business Bank 2022). This faster rate is attributed to



the decline in male-dominated skilled trades like the construction industry while the service sector, which employs more women, is on the rise (Office for National Statistics 2014). For example, women in the construction sector only account for 9 percent of SMEs, while they are more present in education (44%), health and social care (37%), arts and entertainment (31%), other services (30%), and the food sectors (29%) (Hutton 2022).

The self-employed labour force had a steady increase from 1978 to 1989, more than doubling from 1.6 percent to 3.6 percent. However, after a short decrease in the early 1990s, there was a steady decline in 2001 to 2 percent (Taylor 2004). The moments of decline are cited as being due to the recessions of the early 1980s and 1990s as well as the increase in outflows outweighing the increase in inflows (Meager 1992; Taylor 2001; Taylor 2004; Office for National Statistics 2014).

The recession of the 1980s, which began in 1981 and lasted through 1982, saw a decline in wage employment, which prompted an increase in self-employment (Bögenhold and Staber 1991). Meager (1992) describes this as a refugee-push motivation to enter self-employment, meaning that when economic times are hard (recession), and wage employment decreases, people will enter self-employment rather than be unemployed (Bögenhold and Staber 1991; Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Congregado and Golpe 2011; Horta, Meoli, and Vismara 2015; Baker, Égert, Fulop, and Mourougane 2018). However, the recession of the 1990s, which began in 1990 and lasted through mid-1991 experienced an 11 percent decline in self-employment. This is cited as due to a changing demand structure,

government policies and initiatives, and more outflow from rather than inflows to self-employment (Taylor 2004).

### *The United States*

Self-employment data in the United States has been collected since the 1940s through the Current Population Survey (CPS). This data includes social and economic factors, the unemployed, public and private employment, as well as sub-divisions of employed to include wage and salary, self-employed, and unpaid family workers (Hipple 2010). The social factors include age, race, gender, educational attainment, and income (Noorderhaven et al. 1999; Rissman 2003; Fairlie 2005; Nikolova and Bargar 2010; Dvouletý and Lukeš 2016). The economic factors include outside forces like current work status, government policy implementation, shocks to the economy, current political party, and sector of employment (Meager 1992; Hipple 2004; Borjas 2013; Mayer 2014; Freedström, Peltonen, and Wincent 2021). Further division of the self-employment category includes those that are incorporated and unincorporated (Hipple and Hammond 2016; Bureau of Labor Statistics 2022).

The self-employed in the United States consist of males and females from varying races and ethnic backgrounds. They also come from all sectors of the labor force, which includes the public and private sectors and unemployment (Evans and Leighton 1989; Commission of the European Communities et. al. 1993, Hammouya 1999; Borjas 2013; Mayer 2014; Bureau of Labor Statistics 2022a; OECD 2022b; OECD 2022d). The self-employment rate in the U.S., on the whole, has steadily declined over the last 80 years, with rates as high as 15 percent in the early 1960s to as low as 6 percent in 2020. Self-employment has typically declined during extreme economic shocks and increased during

times of economic booms (Burns and Mitchell 1946; Lucas 2003; Benedict and Hakobyan 2008). This is tied to the propensity-pull motivation to enter self-employment in the U.S., entering self-employment is seen as an opportunity to make money (Meager 1992; Benedict and Hakobyan 2008).

One reason for the decline in self-employment is the reclassification of the self-employed to wage-employed in 1967 (Becker 1984; Hipple 2004). This reclassification was based on a new question on the Current Population Survey (CPS) which asked individuals whether they were incorporated or unincorporated self-employed. Those who responded as incorporated were switched over to wage-employee status because the incorporated self-employed who owned their own businesses were also paying themselves as a wage employee (Becker 1984; Polivka and Miller 1998; Hipple 2004). This reframed the incorporated self-employed into the wage employment category. However, the CPS was reworked in 1994 and 2003 to be more inclusive of the questions asked as well as another reclassification of the self-employed back to the categories of incorporated and unincorporated (Hipple 2004).

However, while self-employment has holistically declined, when broken into the agricultural and non-agricultural groups, there is a rise in non-agricultural and fall in agricultural over time. For example, from the early 1970s to the late 1980s non-agricultural self-employment increased from about 5.2 million to 7.6 million. More specifically, during the 1981-82 recession, self-employment increased 4 percent (Becker 1984). On the other hand, in the 1990s and early 2000s self-employment declined due to decreases in wage employment wages, education, and experience (Evans and Leighton 1989; Meager 1992). The 1990-91 recession saw a decrease of roughly 1.5 million jobs,

with about one million of those in the construction and manufacturing sectors (Singleton 1993). Additionally, in 2001 the U.S. economy experienced the Y2K scare and the 9/11 attacks, which contributed to a short-lived recession (Amadeo 2021).

Another example of a decline in self-employment is the financial crisis of 2007/2008. This financial crisis was cited as beginning with a housing bubble burst in mid-2006 followed by a liquidity crunch in 2007 in the shadow banking system, which includes money market funds, investment banking, hedge funds, insurance and mortgage companies, and government sponsored enterprises (Kelley et. al. 2012). This financial crisis was the weakest economic system for the United States since the 1980s recession, which included decreases in entrance to self-employment, TEA, and EBO in the United States as compared to other efficiency and innovation -driven economies (Ali et. al. 2009, 2010).

On the other hand, the increases in self-employment can be attributed to the Employee Retirement Income Security Act of 1974 (ERISA) and the Revenue Act of 1978. ERISA regulated private pensions and accounting controls by establishing the Pension Benefit Guaranty Corporation. Additionally, the Revenue Act of 1978 included flexible benefit plans, 401(k) retirement savings plans, and pre-tax contributions (Schwenk 2003). While wage employment was in decline, sufficing policy reform, non-agricultural self-employment was increasing year over year. These self-employed jobs included business start-ups as well as self-employment as a second job (Becker 1984).

#### *Self-employment Relationships*

The cyclical relationship between self-employment and entrepreneurship includes the expansion of an economy during times of prosperity (a boom) and contraction of the

economy during economic downturns (recession) (Burns and Mitchell 1946; Lucas 2003; Benedict and Hakobyan 2008). This relationship is described as the business cycle, which is not time specific, having from one to as many as twelve years between cycles, and is a response to monetary shocks to the economy that cause cyclical effects (Burns and Mitchell 1946; Lucas 2003). Benedict and Hakobyan (2008) add that when the business cycle contracts (recession), the rise in unemployment leads people to choose self-employment out of necessity. On the other hand, when a recession occurs and businesses shut down, it lowers the price of capital equipment and provides an opportunity for new business ventures (Benedict and Hakobyan 2008).

Another relationship that provides perspective on the motivation of people to enter self-employment is the one between self-employment and unemployment. This relationship prompts studies to identify which way the relationship exists. For example, when unemployment affects self-employment, a positive relationship is identified. This means that when unemployment increases, self-employment will also increase; indicating that the move to self-employment is out of necessity (Meager 1992; Benedict and Hakobyan 2008; Congregado and Golpe 2011; Horta, Meoli, and Vismara 2015). On the other hand, when self-employment affects unemployment, an inverse relationship is identified. This means that when self-employment increases, unemployment will decrease; indicating that movement to self-employment is motivated by the opportunity to make more money (Meager 1992; Benedict and Hakobyan 2008; Congregado and Golpe 2011; Horta, Meoli, and Vismara 2015).

When people enter self-employment as a last option, or as a mode of survival, it is known as the recession-push, or refugee effect. The recession push hypothesis states that

people will turn to self-employment as a last resort for income during an economic downturn (Meager 1992; Benedict and Hakobyan 2008; Garba 2012). Conversely, the propensity-pull, or entrepreneurial effect, occurs when people enter self-employment for the opportunity to make money (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; OECD 2022d). Thus, the propensity pull hypothesis affirms that people see an economic downturn as an opportunity to be innovative, and the prospect of making more money pulls them into self-employment (Meager 1992; Benedict and Hakobyan 2008; Garba 2012; Cullen, Johnson, and Parboteeah 2014).

### *Shocks to the Economy*

An economic shock is an internal or external disturbance that positively or negatively affects an existing economic system (Borjas 2013). This disturbance is described as a crisis or natural disaster that affects final expenditures like a country's GDP in terms of consumption, investment, and inventories (Hashiguchi, Yamano, and Webb 2017). Internal shocks include changes to government spending, fiscal or monetary policies, taxes, wages, finances, and economic expansions and recessions (Auerbach and Gorodnichenko 2010). For example, the 1979-1983 financial crisis in the United Kingdom caused a change to the motivation of people to enter self-employment (Meager 1992). External shocks include disturbances from other economies like changes to supply chains, global production structures, exchange rates, and product demand (Hashiguchi, Yamano, and Webb 2017). For example, the Arab Israeli War prompted an oil crisis in 1973 which affected oil prices around the world (Smith 2009). Another example is the COVID-19 outbreak in 2020, which caused global economic disturbances.

Additionally, shocks can be positive or negative. Positive shocks include increases in wages, job availability, government spending, and production, and decreases to taxes, unemployment, and cost of living (Blanchard and Perotti 2002). Positive shocks are also identified by increases in production and decreases in unemployment. For example, a decrease in unemployment means there is an increase in inflation. This increased inflation is indicative of an increase in wages (Akerlof and Shiller 2009). A negative shock includes increases in prices, taxes, and barriers to trade, and decreases to wages, job availability, and production of goods (Blanchard and Perotti 2002). For example, when a recession exists it can affect the employment sector, causing people to lose their jobs, thereby increasing unemployment (Borjas 2013). The increase in unemployment can cause people to feel pushed to find an alternative to unemployment and will enter self-employment out of necessity (Meager 1992; Benedict and Hakobyan 2008; Congregado and Golpe 2011; Horta, Meoli, and Vismara 2015).

When people feel pushed to enter self-employment as a survival strategy, or last option of employment, it is known as a recession-push, or refugee effect. The refugee push hypothesis states that in times of economic downturn, people (who are typically unemployed at the time) will turn to self-employment as a last resort for income (Meager 1992; Benedict and Hakobyan 2008; Garba 2012). On the other hand, those who enter self-employment as an opportunity to make more money is known as a propensity-pull, or the entrepreneurial effect (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; OECD 2022d). The propensity pull hypothesis includes those people that see an economic downturn as an opportunity to be innovative and, in turn, are pulled into self-employment by the prospect of making more money (Meager

1992; Benedict and Hakobyan 2008; Garba 2012; Cullen, Johnson, and Parboteeah 2014).

## Data and Methods

### *Data - Variables*

This study focuses on a comparative analysis between the United States and United Kingdom to provide an assessment of self-employment after an economic shock. The dependent variable is the rate of self-employment, which is the number of self-employed divided by the total employed and is used rather than the level of self-employment because it deflates the data and allows for international comparability (Meager 1992). The independent variables include employment in the non-agricultural (*NAg*) sectors, (*Shocks*) to the economy, the gross domestic product (*GDP*) per capita growth, lending interest rate (*IR*), the political party (*PolParty*), unemployment (*UE*), and employment rate (*E*).

Non-agricultural employment ( $NAg_t$ ), which is calculated as the percent of people employed in the nonagricultural sector of employment, is included to determine if there is an inverse relationship between self-employment and wage employment (Hipple and Hammond 2016). There has been a continued decrease in the agricultural sector of self-employment, which can be attributed to the increase in industrialized business development (Hipple and Hammond 2016). The gross domestic product ( $GDPPCG_t$ ) per capita growth variable, which is the gross domestic product divided by midyear population, is added as an indicator of economic growth, which is linked to an increase in entrepreneurial activity (Meager 1992; Reynolds, Hay, Bygrave, Camp, and Autio 2000;



Thai and Turkina 2014; Hipple and Hammond 2016; Krueger 2020; World Bank 2022). Therefore,  $GDPPCG_t$  is used to capture this growth.

The lending interest rate ( $IR_t$ ) is used as a proxy for policy implementation and is included to assess the impact of government policies. There are many types of interest rates (real, nominal, fixed, variable, compound, simple, etc.). However, the one that directly impacts self-employment is the lending interest rate, which is the bank rate that includes short- and medium-term financing specifically in the private sector (The World Bank 2023). The Board of Governors of the Federal Reserve System (2016) states that higher lending interest rates deter people from borrowing money. Therefore, the lending interest rate ( $IR_t$ ) is included to determine if an inverse relationship exists between the lending interest rate and self-employment (Auerbach and Gorodnichenko 2013; Watson and Kaeding 2019; Krueger 2020).

The  $Shocks_{it}$  variable is included to determine if an economic shock to the economy affects self-employment. Meager (1992) found a change in the motivation to enter self-employment after the 1979-1983 recession in the United Kingdom. Before the recession, people were pulled into self-employment by the prospect of making money. However, after the recession, the motivation shifted to people being pushed into self-employment. This shift is noticed by the change in the relationship between self-employment and unemployment.

To identify if this shift has occurred after an economic shock, a shock year is determined. A year is identified as a *shock* year if the unemployment rate from the previous year increases by one standard deviation (1.59% for the United States and 2.65% for the United Kingdom) or higher. This is additionally verified by a decrease of

one standard deviation (2.1% in the United States and 2.76% in the United Kingdom) of the difference in the GDP per capita growth rate from year to year. The  $Shocks_{it}$  variable is identified as an indicator variable with (1) meaning there was a shock in that year and (0) otherwise. Four years meet the shock qualifications for each country. In the United States the shock years are 1975 (y75) with an unemployment rate of 8.48%, 1982 (y82) with an unemployment rate of 9.71%, 2009 (y09) with an unemployment rate of 9.28%, and 2020 (y20) with an unemployment rate of 8.09%. In the United Kingdom the shock years are 1981 (y81) with an unemployment rate of 9.63%, 1993 (y93) with an unemployment rate of 10.4%, 2009 (y09) with an unemployment rate of 7.61%, and 2020 (y20) with an unemployment rate of 4.52%. Additionally, the shock year variables are also used as an interaction variable with unemployment ( $y75unempl$ ,  $y81unempl$ ,  $y82unempl$ ,  $y09unempl$ , and  $y20unempl$ ) to determine if an economic shock to the economy causes a change in the motivation of the decision to enter self-employment. If the interaction variable's coefficient is positive there is a refugee-push effect present and if the coefficient is negative, there is a propensity-pull effect present (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012).

Unemployment rate ( $UE_t$ ), which is the number of unemployed divided by the total working age population (OECD 2022c), is utilized as a proxy for the motivation to enter self-employment. This variable is used to determine if the relationship with self-employment in the long-run is positive (refugee-push) or negative (entrepreneurial-pull) (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012). The employment rate ( $E$ ), which is the total employed population (18-64) minus the self-employed population, is used as a proxy for the total inflow and outflow data (OECD

2022b). Meager (1992) used inflow and outflow data to generate 3 equations: an inflow equation, outflow equation, and combined employee equation. The inflow equation is  $I_t = \alpha + \beta U_t + ct$ , where (t) is a time trend to pick up secular trends on entry into self-employment. When ( $\beta$ ) is greater than 0, it defines the refugee-push hypothesis. Conversely, when ( $\beta$ ) is less than 0, it indicates a propensity-pull hypothesis. The outflow equation is  $O_t = d + eU_t + fI_{t-2} + gt$ , where the propensity-pull hypothesis is established when the coefficient ( $e$ ) is greater than 0. However, when ( $e$ ) is less than 0 it indicates a refugee-push hypothesis. Additionally, outflows should be counter-cyclical to either unemployment or economic activity (Meager 1992). The combined equation is  $S_t = S_{t-1} + I_t - O_t$ , where the total stock of flows is equal to the previous year's stock flow plus the current year's inflow minus the current year's outflow (Meager 1992). The combined equation is indicative of employment data and is used as a proxy to the inflow and outflow data (Meager 1992).

Political party (*PolParty*) is included to identify if the change in political office affects self-employment. In the United Kingdom there are two dominant parties: Conservative, indicated by 1, and Labour, indicated by 0 (Gov.UK 2023). The Labour party pushes for equality of all individuals, including the Equal Pay Act of 1970, the Equality Act, Human Rights Act, Climate Change Act, increased educational attainment for all citizens, increased Nation Health Services (NHS), and increased minimum wage (The Labour Party 2023). The Conservative party pushes for lower taxes for all citizens, controlling immigration, increased NHS services, building a strong economy, and increasing police presence for a safer environment (The Conservative Party 2023). Additionally, in the United States there are also two dominant political parties:

Republicans, indicated by 1, and Democrats, indicated by 0 (Encyclopaedia Britannica 2023). The Republican party pushes policies for business owners, fights for lower taxes, believes in decreased government spending as it relates to intervening with the economy, and supports wages being regulated by a free market (Congress.gov 2023). The Democratic party pushes for government intervention, encourages deficit spending during economic downturns, and believes in government regulation of wages (Blinder and Watson 2014).

### *Methods*

This essay will utilize economic data from the World Bank (2022), U.S. Bureau of Labor Statistics (2022b, 2022c, 2022e, 2022f), Bank of England (2022), Building Societies Association (2013), Encyclopaedia Britannica (2023), Gov.UK (2023), and Office for National Statistics (2022a, 2022b, 2022c, 2022d) from 1962 to 2020 in the United States and the United Kingdom to expand on Meager's (1992) findings that the motivation to enter self-employment in the United Kingdom (UK) changed after 1983. The United Kingdom and United States models are run as multiple linear time-series regressions, while the combined data is run as a panel data set. Additional information on where variables come from and how they are calculated is available in Appendix A.

Time series analysis compares variables at successive, equally spaced intervals of time (Barro 1997). The key feature to time series analysis is that the data is rarely independent of each other due to the influence of future events and lags in behavior (Wooldridge 2019). Panel data, or longitudinal data, includes both cross sectional and time series data that follows the same panel (UK and US) over time. However, in a panel, it cannot be assumed that the observations are independently distributed across time.

Therefore, we must difference (first difference or include a time variable) to remove the time constraint (Wooldridge 2019).

Additionally, a case study comparative analysis of most-different-systems is used to compare the commonalities and differences between the United States and United Kingdom. The case study method is utilized to compare variables of interest after an event, in this study a shock, has occurred (Berg and Lune 2012; Yin 2018). This method is included to provide important contextual information relevant to the discussion on if shocks affect self-employment. A comparative analysis provides an opportunity to observe the impact of statistical findings through a positive method of agreement or negative method of difference (Smelser 1976; Graffigna, Bosio, and Olson 2010). Therefore, a comparative case study analysis is used to compare like or unlike circumstances that are necessary to answer the research question and includes non-statistical analysis of a small number of cases (George and Bennett 2005).

The following model includes independent variables across countries, signified by (*i*), time, signified by (*t*), and multiple panels within a variable, signified by (*j*). The model,

$$SE_{it} = \beta_0 + \beta_1 NAg_{it} + \beta_2 Shocks_{ijt} + \beta_3 GDPPCG_{it} + \beta_4 IR_{it} + \beta_5 PolParty_{it} + \beta_6 UE_{it} + \beta_7 E_{it} + \varepsilon \quad (2)$$

is used to determine if shocks to the economy play a role in self-employment.  $NAg_{it}$  is the percentage of people employed in the non-agricultural sector in a given year,  $Shocks_{ijt}$  indicates that a shock occurred in a given year and is further defined by individual shock years ( $y75_{US}$ ,  $y81_{UK}$ ,  $y82_{US}$ ,  $y93_{UK}$ ,  $y09_i$ , and  $y20_i$ ),  $GDPPCG_{it}$  is the gross domestic product per capita growth in a given year,  $IR_{it}$  is the lending interest

rate, or the the bank rate that includes short- and medium-term financing specifically in the private sector, in a given year,  $PolParty_{it}$  is the political party in office in a given year,  $UE_{it}$  is the unemployment rate in a given year, and  $E_{it}$  is the employment rate in a given year. This model is used to formulate the following hypotheses:

$H_0$ : Increases in the interest rate will not affect self-employment.

$H_1$ : Increases in the interest rate will negatively affect self-employment.

$H_0$ : A severe shock (more than one standard deviation change in unemployment) will not cause a structural change in the unemployment - self-employment relationship.

$H_2$ : A severe shock (more than one standard deviation change in unemployment) will cause a structural change in the unemployment - self-employment relationship.

$H_0$ : Unemployment positively (refuge push) affects self-employment after a shock.

$H_3$ : Unemployment negatively (propensity-pull) affects self-employment after a shock.

$H_0$ : A change in the political party will not affect self-employment.

$H_4$ : A change in the political party will affect self-employment.

### Analysis and Results

The regression model for the United Kingdom, United States, and a combined model are tested for goodness of fit, normality, homoscedasticity, randomness, and autoregressive qualities (i.e., is the model an AR(1) or AR(2)). Next, they are tested to determine if there is a unit root, which would yield I(1), or if there is no unit root present, which would yield the model I(0). If there is a unit root, it is determined if it takes a random walk or has a drift. Last, the models are detrended with the addition of a year variable and includes a quadratic of the year to determine if self-employment is increasing or decreasing over time.

### *United Kingdom model*

For the United Kingdom, the Kolmoglov-Smirnoff normality test yields a p-value not high enough to confirm normality of the data, however the SWilk and SFrancia tests yield normality of the residual errors. The Heteroskedasticity test and White's test confirm that the model is homoscedastic and that there is constant variance. The Wald-Wolfowitz Runs test was performed and concluded that the dependent variable is random, but not about the mean or median. This means that there is a negative serial correlation between yearly self-employment numbers. Therefore, self-employment numbers that are higher than the mean or median in one year are then followed by numbers that are lower and vice versa in the next (Naghshpour 2016).

This model follows an autoregressive model of order 1, AR(1), which means that nothing passed the first lag, both with unemployment and the interest rate and the lag of the dependent variable in an individual test, affects this model. This means that there is a short-term relationship between unemployment and self-employment and the interest rate and self-employment. The correlation value for the lag of self-employment was .9879, for unemployment was .9495, and the interest rate was .8834. None of these values were equal to 1, so the model is classified as I(0) and does not have a unit root. The Dickey-Fuller unit root test at the 10 percent critical value confirms these results and the null is rejected, classifying the model as I(0). This means that the first difference includes a weakly dependent process but is often stationary, and nothing needs to be done to use the data (Wooldridge 2019). However, since the model is categorized as I(0), a time variable will need to be added to account for trending behavior in the variables and to detrend the data. Additionally, the Rho value in the augmented Dickey-Fuller test equals 0.971,

which is very close to but not equal to 1. This means that the errors are consistent, and the variance gets smaller as the population grows (Wooldridge 2019). Therefore, a time trend could be used to detrend the model.

#### *United States model*

For the United States, the Kolmogorov-Smirnoff normality test yields a p-value high enough to confirm normality of the data. The White's test for heteroskedasticity confirms that the model is homoscedastic and that there is constant variance. The Wald-Wolfowitz Runs test concluded that the dependent variable is random, but not regarding the mean or median. This means that there is a negative serial correlation between yearly self-employment numbers. Therefore, self-employment numbers that are higher than the mean or median in one year are then followed by numbers that are lower and vice versa in the next (Naghshpour 2016).

The US model follows an autoregressive model of order 1, AR(1), which means that nothing passed the first lag, both with unemployment and the interest rate and the lag of the dependent variable in an individual test, affects this model. This means that there is a short-term relationship between unemployment and self-employment and the interest rate and self-employment. The correlation command was run to determine if the model has a unit root. The correlation value for the lag of self-employment was .9920, for unemployment was .7623, and the interest rate was .8652. None of these values were equal to 1, so the model is classified as I(0) and does not have a unit root. The Dickey-Fuller unit root test confirms these results and rejects the null of a unit root, classifying the model as I(0). This means that the model includes a weakly dependent process, and nothing needs to be done to use the data (Wooldridge 2019). However, since the model is



categorized as  $I(0)$ , a time variable will need to be added to account for trending behavior in the variables and to detrend the data. Additionally, the Rho value in the augmented Dickey-Fuller test equals 0.93, which is very close to but not equal to 1. This means that the errors are consistent, and the variance gets smaller as the population grows (Wooldridge 2019).

#### *Combined panel model*

For the combined model, the Kolmogorov-Smirnoff normality test yields a p-value high enough to confirm normality of the data. The Heteroskedasticity test and White's test confirm that the model is homoscedastic and that there is constant variance. The Wald-Wolfowitz Runs test was performed and concluded that there is evidence that the dependent variable is not random using the dichotomous up and down, the mean, or the median. This means that there is a negative serial correlation between yearly self-employment numbers and could be indicative of the non-random UK data. This means that the self-employment numbers that are higher in one year are then followed by numbers that are lower, and vice versa, in the next (Naghshpour 2016).

The combined model is identified as a panel with the United Kingdom as 1 and United States as 0. The combined model follows an autoregressive model of order 1, AR(1), which means that nothing passed the first lag, both with unemployment and the interest rate and the lag of the dependent variable in an individual test, affects this model. This means that there is a short-term relationship between unemployment and self-employment and the interest rate and self-employment. The correlation command was run to determine if the model has a unit root. The correlation value for the lag of self-employment was .9957, for unemployment was .8973, and the interest rate was .8776.

None of these values were equal to 1, so the model is classified as  $I(0)$  and does not have a unit root. However, since the model is categorized as  $I(0)$ , a time variable will need to be added to account for trending behavior in the variables and to detrend the data (Wooldridge 2019).

The combined model also included the Mann-Whitney U test, which is an additional nonparametric test used to determine normality of the data. This test was used because the United Kingdom data for self-employment is not normal, and normality is not a requirement in nonparametric testing. This test is used to determine if the medians of the two samples (UK and US) are different (Naghshpour 2016). The null hypothesis is that the mean of sample 1 (UK) minus the mean of sample 2 (US) equals zero:  $H_0 = M_1 - M_2 = 0$ . The alternative hypothesis is  $H_0 = M_1 - M_2 \neq 0$ . The test is run for the self-employment and unemployment variables. For self-employment the p-value is 0.000, indicating that the p-value is small enough to reject the null and the two population means are not the same. For unemployment the p-value is 0.9207, indicating that the p-value is not small enough to reject the null and the two populations are the same. The Kolmogorov-Smirnov is another test used to test the equality of the two distributions: UK and US. In terms of self-employment, it was found that the UK has more self-employed people than the US, however, both countries together are equal regarding self-employment. In terms of unemployment, the UK has fewer unemployed than the US, and they are not equal regarding unemployment rates.

The combined model includes a panel variable, so it was also tested on whether the model is a fixed effects or random effects model. The fixed effects model controls for time-invariant differences between panels, so it cannot be biased because of omitted

time-invariant characteristics (gender, race, culture, religion, etc.) (Torres-Reyna 2007).

In the random effects model the variation across panels is assumed to be random and uncorrelated with the dependent and independent variables. It can also include time-invariant characteristics as they are not absorbed into the intercept like in the fixed effects model (Torres-Reyna 2007). The model was concluded to be a random effects model as the p-value is 0.6585, which is greater than the 0.05 threshold. Additional information on the results of the fixed effects model is found in Appendix B.

Tables 2.1, and 2.2 include the descriptive statistics for the United Kingdom, United States, and combined models, respectively.

Table 2.1

Descriptive Statistics for the United Kingdom and the United States

Variable	Obs	Mean UK	S.D. UK	Min UK	Max UK	Mean US	S.D. US	Min US	Max US
time	59	32	17.18	1	59	30	17.17	1	59
time2	59	1190	1063.19	1	3481	1190	1063.19	1	3481
shocks	59	.067	.25	0	1	.068	.25	0	1
selfempl	59	5.12	1.23	3.31	7.04	8.83	2.06	6.11	15.26
GDPPCG	59	1.78	2.76	-11.36	3.42	2.02	1.99	-3.45	6.31
unempl	59	6.26	2.60	2.26	11.77	5.99	1.62	3.49	9.71
NonAg	59	98.18	.699	96.9	99.1	96.994	1.49	92.59	98.57
IntRate	59	6.66	4.51	.1	17	7.18	3.28	3.25	18.87
PolParty	59	.593	.495	0	1	.542	.502	0	1

†Obs is the number of observations, which is also the number of years.

†Mean is the mean of the data over the number of years.

†S.D. is the standard deviation of the data.

†Min and Max are the minimum and maximum values of the data.

Table 2.2

Descriptive Statistics for the combined regression model

Variable	Obs	Mean	St. Dev.	Min	Max
shocks	118	.068	.252	0	1

Table 2.2 (continued)

selfempl	118	6.972	2.516	3.31	15.26
GDPPCG	118	1.85	2.45	-11.36	6.42
unemployed	118	6.129	2.164	2.26	11.77
employed	94	70.76	2.493	65.42	76.2
NonAgEmpl	108	97.536	1.334	92.59	99.1
TaxRate	80	13.057	4.529	4.7	20
InterestRate	118	6.92	3.934	.1	18.87
PolParty	118	.568	.497	0	1
time	118	30	17.102	3	59
time2	118	1190	1058.64	1	3481

†Obs is the number of observations, which is also the number of years.

†Mean is the mean of the data over the number of years.

†Std. Dev. is the standard deviation of the data.

†Min and Max are the minimum and maximum values of the data.

Table 2.3 includes the basic model and model that includes the additional variables for the United Kingdom (model 1 and 2), the United States (model 3 and 4), and the combined, or pooled, models (5 and 6). Models 1, 3, and 5 use the original variables from Meager's (1992) study. Models 2, 4, and 6 use an expanded model to include additional variables, as well as the interaction variables. The  $R^2$  ranges from 56.1% to 99.2% with a constant f-statistic of 0.000.

Table 2.3

Outcomes of dependent variable, self-employment with individual and combined models

	(1) UK	(2) UK	(3) US	(4) US	(5) Combined	(6) Combined
unempl	.095*** (.036)	.004 (.071)	.071* (.038)	.119 (.096)	-.148* (.076)	.049 (.049)
NonAgEmpl	1.389*** (.125)	-.003 (.196)	-1.34*** (.042)	-.427** (.174)	-1.334*** (.122)	.012 (.114)
L.selfempl		.587*** (.088)		.675*** (.096)		.96*** (.026)
L.unempl		.134*** (.046)		.02 (.092)		-.014 (.038)

Table 2.3 (continued)

employed		.158***		.116		.013
		(.060)		(.122)		(.024)
PolParty		.193**		.112*		.091*
		(.088)		(.070)		(.052)
y75unempl				.001		.03
				(.034)		(.03)
y81unempl		.019				.004
		(.019)				(.024)
y82unempl				.007		.01
				(.027)		(.019)
y93unempl		-.005				-.002
		(.15				(.022)
y09unempl		.008		.01		.014
		(.023)		(.033)		(.03)
y20unempl		-.155***		.002		.002
		(.053)		(.045)		(.038)
_cons	-131.609***	-10.637	138.281***	36.817*	138.462***	-2.201
	(12.338)	(19.209)	(4.099)	(18.651)	(11.911)	(11.217)
Obs	50	50	59	58	109	108
R-squared	.74	.987	.956	.991	.561	.992

Note: Standard errors are in parentheses \* $p < .1$ ; \*\* $p < .05$ ; \*\*\* $p < .01$

Note: Additional variables included in the study that were not significant: *time*, which detrends the data; *time*<sup>2</sup>, which provides data on long-term trends; *InterestRate*, which has a negative coefficient for the UK, but a positive coefficient for the US and combined model; *shocks* which is a dummy variable for each shock year (75, 81, 82, 93, 09, and 20); *UK*, which is a dummy variable where the UK equals 1; and *GDPPCG*, which is the GDP per capita growth.

### *Rerun of original model with expanded time frame*

Model 1 is the base model for the United Kingdom. The significant variables are the unemployment rate and non-agricultural employment. The unemployment rate has a positive coefficient of .095, indicating that there is a positive relationship between unemployment and self-employment. This means that when the unemployment rate increases by one unit the self-employment rate will increase by 9.5%. This is also indicative of a refugee-push effect where people enter self-employment because they feel they have no other option (Meager 1992; Noorderhaven et. al. 1999; Benedict and

Hakobyan 2008; Garba 2012). The *NonAgEmpl* variable has a significant positive coefficient of 1.389 indicating a perfect positive linear relationship with self-employment, meaning that as non-agricultural employment increases by one percent, self-employment will increase by 1.39 percent. This finding also parallels the non-agricultural sector of self-employment, which increases as a specific sector even when self-employment as a whole has declined (Meager 1992; Ratner 2009).

Model 3 is the base model for the United States. The significant variables are unemployment and non-agricultural employment rates. The unemployment rate, *unempl*, has a positive coefficient of .071 indicating that when unemployment increases by one percent, self-employment will also increase by 7.1%. This positive relationship is indicative of the refugee-push hypothesis (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018). The non-agricultural employment rate, *NonAgEmpl*, has a negative coefficient of -1.34. This coefficient being over one indicates a perfect negative linear relationship, meaning that when non-agricultural employment increases by one percent, self-employment will decrease by 1.34% (Ratner 2009).

Model 5 is the base model for pooled data of the US and UK. The significant variables are the unemployment and non-agricultural employment rate. The unemployment rate, *unempl*, has a negative coefficient of -.148, which means that there is an inverse relationship between unemployment and self-employment. This means that when unemployment increases by one percent, self-employment will decrease by 14.8%. The non-agricultural employment rate, *NonAgEmpl*, has a negative coefficient of -1.334. This coefficient being over one indicates a perfect negative linear relationship, meaning

that when non-agricultural employment increases by one percent, self-employment will decrease by 1.33% (Ratner 2009). This can be attributed to an overall increase in wage employment. An increase in wage employment and decrease in self-employment is another indicator of a refugee-push effect (Meager 1992).

*Models run with expanded time and variables*

Model 2 is the expanded individual model of the United Kingdom. The significant variables include the lag of self-employment, the lag of unemployment, the employment rate, political party, and the interaction of the *y20unempl* variable. The *L.selfempl* variable has a coefficient of .587 indicating that when the previous year's self-employment rate increases by one percent, the current year of self-employment will increase by 58.7%. This increase from one year to the next could be a sign of progression through the entrepreneurial cycle (Meager 1992; Bosma et al. 2021). The *L.unempl* variable is also positive with a coefficient of .134, indicating that when the previous year's unemployment rate increases, self-employment will also increase by 13.4%. This positive relationship is indicative of the refugee-push hypothesis and is consistent with Meager's (1992) findings.

The employment rate, or the *employed* variable, also has a positive coefficient of .158 meaning that when the employment rate increases by one percent, the self-employment rate will increase by 15.8%. This variable is a proxy for the difference between the inflow to and outflows from self-employment. The positive relationship indicates that there are more people entering self-employment than leaving self-employment, resulting in a net gain of self-employment (Meager 1992). The political party, *PolParty*, variable has a positive coefficient of 0.193, indicating that when the

Conservative political party is in office, self-employment increases by 19.3%. This is consistent with previous times of economic strife where the Conservative party has supported entrance to self-employment (Meager 1992). The interactive variable of *y20unempl* had a negative coefficient of -0.155 indicating an inverse relationship between unemployment and self-employment in the year 2020. This means that in 2020, a one percent increase in unemployment caused self-employment to decrease by 15.5%. However, it also indicates that the motivation to enter self-employment was seen as an opportunity (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018).

Model 4 is the expanded model of the United States. The significant variables are non-agricultural employment, *NonAgEmpl*, the lag of self-employment, *L.selfempl*, and the political party, *PolParty*. The *NonAgEmpl* variable has a negative coefficient of -0.427 indicating an inverse relationship between non-agricultural employment and self-employment. This means that when the non-agricultural employee sector increases by one unit, self-employment will decrease by 42.7%. The *L.selfempl* variable has a positive coefficient of 0.675 meaning that if people were self-employed in the previous year, they are 67.5% likely to be self-employed in the current year. This increase from one year to the next could be a sign of progression through the entrepreneurial cycle (Meager 1992; Bosma et al. 2021). The *PolParty* variable has a positive coefficient of .112, indicating that when the Republican party is in office, self-employment increases by 11.2%. This is consistent with the literature as the Republican party is known to push policies to increase business ownership (Congress.gov 2023).



Model 6 is the combined model of the UK and US. The significant variables are the lag of self-employment and the political party. The lag of self-employment, *L.selfempl*, has a positive coefficient of 0.96 meaning that when people were self-employed in the previous year, they are 96% likely to be self-employed in the current year. The political party, *PolParty*, variable has a positive coefficient of 0.091 meaning that when the Conservative party in the UK and the Republican party in the US is in office, self-employment will increase by 9.1%.

### *Hypotheses*

Hypothesis 1 states that the interest rate will negatively affect self-employment, which includes an inverse relationship between the interest rate and self-employment. The interest rate was not significant in any of the expanded models and had mixed signs for the coefficients including -.019 for the UK model, .008 for the US model, and .011 for the combined model. This means that we reject the null in the UK model and state that there is a negative relationship between self-employment and the interest rate, which is consistent with the literature (Evans and Leighton 1989; Board of Governors of the Federal Reserve System 2016).

However, for the US and combined models we fail to reject the null and state that there is a positive relationship between self-employment and the interest rate. While not consistent with the literature, this positive relationship between the interest rate and self-employment is practical. For example, the interest rate is utilized as a policy tactic to combat inflation. When interest rates increase, hourly wage employees' income will decrease (Evans and Leighton 1989; Taylor 1993; Akerlof and Shiller 2009). This decrease in the wage side of employment could push people to seek alternative options of

employment (i.e., self-employment). Therefore, as the interest rate increases, so will self-employment.

Hypothesis 2 states that a severe shock (more than one standard deviation change in unemployment) will cause a structural change in the relationship between unemployment and self-employment. The shock years are identified as 1981, 1993, 2009, and 2020 in the United Kingdom and 1975, 1982, 2009, and 2020 in the United States. In the United Kingdom there was a structural change from shock year to shock year. For example, the coefficients were (.019) in 1981, (-.005) in 1993, (.008) in 2009, and (-.115) in 2020. Therefore, in the UK model, we would reject the null and say that unemployment causes a structural change in self-employment after a shock to the economy. This could be due to the government policy implementation in the early 1980s, shifting the motivation to enter self-employment from a propensity-pull to a refugee-push (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018).

However, in the United States, there was not a change in the structure of the relationship between unemployment and self-employment. The coefficients were (.001) in 1975, (.007) in 1982, (.01) in 2009, and (.002) in 2020. Therefore, we fail to reject the null and the relationship between unemployment and self-employment was not affected by a severe shock. This positive relationship between unemployment and self-employment means that when unemployment increases during an economic shock, self-employment also increases, which is consistent with the data. Additionally, in this study, the motivation reflects a refugee-push, or increased entrance due to no other option (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012;

Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018). For the combined model, there was a structural change from 1982 to 1993, and then again from 1993 to 2009. The coefficients were (.03) in 1975, (.004) in 1981, (.01) in 1982, (-.002) in 1993, (.014) in 2009, and (.002) in 2020. Therefore, we fail to reject the null and state that for the combined model, the relationship between unemployment and self-employment was affected by a severe shock.

Hypothesis 3 states that unemployment will negatively affect self-employment after a shock. The only shock year that was significant in all three studies was 2020 in the United Kingdom model when it was interacted with unemployment. The variable (*y20unempl*) had a negative coefficient of -.155 meaning that when unemployment increased in 2020, self-employment decreased by 15.5%. It is confirmed that in 2020, the unemployment rate did increase in the US from an annual average of 3.68 in 2019 to 8.09 in 2020. In the UK, the unemployment rate increased from an annual average of 3.83 in 2019 to 4.52 in 2020. However, the self-employment rate in the US increased from an annual average of 6.11 in 2019 to 6.32 in 2020, while the self-employment rate in the UK decreased from 6.99 in 2019 to 6.48 in 2020. Therefore, when combined, the self-employment rate does show a decrease from a total of 13.1 in 2019 to 12.8 in 2020.

This provides mixed reviews for the other shock years in the United Kingdom. For example, in 1981, self-employment did not decrease, but unemployment did increase. In 1993 and 2009, self-employment decreased, and unemployment increased. In the United States, all four shock years included increases in self-employment and in unemployment and the coefficient for unemployment was positive. In the combined model the coefficient for unemployment was negative. However, in both the US and

combined model unemployment was not significant. Based on the inconsistent coefficient signs, there is not enough evidence to reject the null, so we will fail to reject the null and conclude that unemployment does not negatively affect self-employment after a shock.

Hypothesis 4 states that a change in the political party will affect self-employment. The political party variable is significant in all three of the expanded models with positive coefficients of (.193) in the UK, (.112) in the US, and (.091) in the combined model. These models provide a positive relationship between the Conservative party in the UK and the Republican party in the US showing an increase in self-employment at 19.3% for the UK independent model, 11.2% for the US independent model, and 9.1% for the combined model. During previous times of economic strife in the UK, the Conservative party supported entrance into self-employment (Meager 1992). For example, the Thatcher administration specifically pushed for an enterprise economy, looking to increase the economic activity through the self-employed (Meager 1992). While self-employment numbers did rise, the structure of how people entered self-employed changed from a propensity-pull to a refugee-push. However, the positive relationship for the US and the combined model is consistent with US literature indicating that the Republican party pushes policies for business owners and fights for lower taxes (Congress.gov 2023). Based on this information, we will reject the null and state that there is enough evidence to support that political parties do affect entrance to self-employment.

#### Comparative Analysis

This study includes a comparative analysis of the most-different-systems design that compares the social and cultural factors of the United States and the United Kingdom

to provide an assessment of the commonalities and differences between these countries during times of economic shock (Berg and Lune 2012). Therefore, the basis of the discussion revolves around the individual shock years of each country: 1981, 1993, 2009, and 2020 for the United Kingdom and 1975, 1982, 2009, and 2020 for the United States. While each country was visibly affected by shocks in each of these years, the countries themselves responded to the economic shock in different ways. The following assessment highlights each shock year and its contributing factors.

*United Kingdom: 1981 and United States: 1982*

Prior to 1979, the UK had a propensity-pull relationship between unemployment and self-employment. This meant that self-employment increased when the economy grew, and unemployment decreased. However, Meager (1992) found that after 1983, the rise in unemployment prompted a rise in self-employment, indicating a refugee-push relationship. There were two reasons cited as potential causes: the recession from 1979 - 1983 and the subsequent policy implementation from the Thatcher government that promoted an enterprise culture (Meager 1992). The recession caused an increase in unemployment, which was combated by policy implementation that inevitably increased inflows to self-employment (Meager 1992). For example, to combat the increase in unemployment, an incentive program called the Enterprise Allowance Scheme, which guaranteed £40 (\$72.20) per week to unemployed people who started their own business, was implemented (Office for National Statistics 2014). Subsequently, between 1979 and 1988, the self-employment rate increased at an average annual rate of 5.2 percent per year, which was the fastest growth in the European Community countries (Meager, Kaiser, and Dietrich 1992).

While policy implementation at the start-up phase can create an increased entrance to self-employment, providing policy implementation beyond the start-up phase could increase participation towards entrepreneurship, potentially accounting for the outflow from self-employment (Meager 1992; Watson and Kaeding 2019; Freedström, Peltonen, and Wincent 2021). For example, during the 1979-83 recession, the outflows did increase from 48 to 58 percent. However, the increase in inflows outweighed the outflows, netting an increase in self-employment during this time (Meager, Kaiser, and Dietrich 1992). The increase in the unemployment rate from 1979 to 1984 with a “shock” spike in 1981, and the overall steady increase in self-employment could have contributed to the positive relationship between unemployment and self-employment during that time (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018). Therefore, shocks coupled with policy implementation could explain the movement in and out of self-employment (Meager 1992).

At the same time, the United States economy experienced an economic shock in 1982. This was indicative of the recession from July of 1981 through November 1982 that resulted from the implementation of monetary policy to decrease inflation (Sablik 2013). This policy tactic included increasing interest rates, which also caused an increase in unemployment (Bryant, Hooper, and Mann 1993; Taylor 1993; Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019; Reynolds, Hay, and Camp 1999). Self-employment was also increasing at that time, which shows a positive relationship between self-employment and unemployment, or a refugee-push effect (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and

Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018). Additionally, in the study, the coefficient for the variable (*y82unempl*) was positive, which confirms this assertion.

Therefore, while both the US and UK experienced an economic shock in 1981 and 1982, their outcomes were different. On one hand, in 1981, the UK experienced an economic shock that caused a structural change in the motivation to enter self-employment. This could be attributed to the government push towards an enterprise economy, which included incentives for people to enter self-employment. This refugee-push of people to enter self-employment caused the relationship with unemployment to be positive and change from an opportunistic view of being self-employed (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018). On the other hand, in 1982, the United States experienced a continued positive relationship between self-employment and unemployment, which is indicative of a refugee push towards self-employment. This could be due to government policy implementations to increase interest rates to combat inflation, which caused unemployment to rise (Bryant, Hooper, and Mann 1993; Taylor 1993; Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019; Reynolds, Hay, and Camp 1999).

#### *United Kingdom: 1993 and United States: 1975*

In 1975, the United States had a positive coefficient for the variable (*y75unempl*), while the United Kingdom had a negative coefficient in 1993 for the variable (*y93unempl*). This indicates a refugee-push in the United States and a propensity-pull effect in the United Kingdom. There were several economic events that could have impacted the United States leading up to the shock year of 75, which pushed people to

self-employment. These events include President Nixon ending the gold standard in 1971, the Organization of the Petroleum Exporting Countries (OPEC) embargo in 1973 followed by an increase in inflation in 1974, and economic contraction in 1975 (Amadeo 2021). During these times, unemployment increased, which is typically followed by a counter-cyclical relationship with self-employment (Bögenhold and Staber 1991; Meager 1992). However, Bögenhold and Staber (1991) discuss Steinmetz and Wright's (1989) findings that over time, the counter-cyclical relationship fades and transitions to a positive relationship. This study verifies the latter with positive coefficients in all four shock years (1975, 1982, 2009, and 2020).

In 1993, the United Kingdom experienced a shock year, which could be an effect of the 1992 Sterling crisis and the recession of the early 1990s. The Sterling crisis resulted in the UK being forced to withdraw sterling from the European Exchange Rate Mechanism (Eichengreen and Hsieh 1995). This withdrawal was a combination of Sterling being overvalued against other currencies, hesitation to increase interest rates to counter the fall, and an increase in unemployment (Eichengreen and Hsieh 1995). The recession in the early 1990s prompted the rise in unemployment and decrease in economic productivity, which resulted in a decrease in wage employment and provided an opportunity for an increase in self-employment (Meager, Kaiser, and Dietrich 1992; Office for National Statistics 2014). This is indicative of the negative coefficient for the variable (*y93unempl*), and consistent with the propensity-pull entrance to self-employment (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018).



The structure of the motivation to enter self-employment in the United States in 1975 and the change in structure in the United Kingdom in 1993 resulted in different relationships between unemployment and self-employment. In both cases, there was an external occurrence that had an effect on the economy, which led to internal government policy implementations that resulted in an increase in unemployment (Eichengreen and Hsieh 1995; Bögenhold and Staber 1991; Meager 1992). However, in the UK the motivation to enter self-employment was a propensity-pull, meaning that people saw the situation as an opportunity to be innovative, and the prospect of making more money pulled them into self-employment (Meager 1992; Benedict and Hakobyan 2008; Garba 2012; Cullen, Johnson, and Parboteeah 2014). However, in the US the motivation to enter self-employment was a refugee-push, meaning that entrance to self-employment was based on necessity, or as a last option of employment (Meager 1992; Benedict and Hakobyan 2008; Garba 2012; Cullen, Johnson, and Parboteeah 2014).

This positive relationship in the United States could be due to an increase in incorporated self-employed between 1947 and 1984. This increase in incorporated self-employment has been found to parallel increases in unemployment (Bögenhold and Staber 1991). It is also noted that younger white males are more likely to enter self-employment if they have more unemployment experience (Evans and Leighton 1989; Bögenhold and Staber 1991). On the other hand, in the United Kingdom, beginning in 1981 there was a significant increase in the non-agricultural self-employment rate from just under 6 percent in the mid-1960s to just over 10 percent by 1987 (Bögenhold and Staber 1991). This increase in self-employment is indicative of an increase in inflow rates, while outflow rates remained steady, and between 1979 and 1989, while men

entering self-employment decreased from 16 percent to 14 percent, women entering self-employment increased from 4 percent to 7 percent during that time (Taylor 2004).

*United Kingdom and United States: 2009*

The shock year of 2009 was a result of the 2007-08 financial crisis, known as the Great Recession (Weinberg 2013). In 2009, the United States and United Kingdom both had a positive coefficient for variable (*y09unempl*). This is consistent with a refugee-push effect of entrance to self-employment, which means that people entered self-employment because they felt they had no other option due to the economic conditions (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018).

In the United States, the financial crisis began in mid-2006 when the housing bubble burst, and technically ended in 2009, even though there was slow economic growth for the next four years (Ali et. al. 2010; Weinberg 2013). The economy as a whole saw an increase in unemployment, more than doubling from under five percent to over ten percent, a decrease in GDP by over four percent, and interest rates hitting their floor, which is between zero and 25 base points (Weinberg 2013). Regarding self-employment, the Great Recession resulted in a decrease in maintaining businesses (EBO), even though nascent entrepreneurs saw the economic downturn as an opportunity to make money. However, with a decrease in initial public offerings of venture-backed companies, the total entrance to self-employment declined in 2009 (Ali et. al. 2009).

The 2007-08 financial crisis led to government program implementations both for individuals and corporations (Weinberg 2013). For individuals, Fannie and Freddie Mac were taken over by the U.S. government to provide assistance in the housing market

(Weinberg 2013). On the corporate side, the Dodd-Frank Wall Street Reform and Consumer Protection Act was signed by President Barack Obama to improve accountability and transparency in the financial system, to protect the American taxpayer by ending bailouts, and protecting consumers from abusive financial services practices (Goodwin 2010).

In the United Kingdom, the 2007-08 financial crisis caused the deepest recession since World War II, which included high rates of unemployment, debt, and many home repossessions (Allen 2010; UK Commission for Employment and Skills 2014). The overall output decreased, causing the GDP to fall consistently from quarter two in 2008 until quarter three in 2009, with the highest decrease in quarter one of 2009 at 2.6% (Allen 2010). However, during this time, the entrance to self-employment in the United Kingdom increased, which was a result of the refugee-push effect as people were looking for an option other than unemployment (UK Commission for Employment and Skills 2014; Giupponi and Xu 2020). The UK economy saw an end to the financial crisis by 2010, where the positive perspectives on entrepreneurship could be a result of government policy implementations, including the New Enterprise Allowance Scheme, Local Enterprise Partnerships, Regional Growth Funds, and Coaching for Growth initiative (Hart and Levie 2010). These programs are intended to facilitate growth and assist the economy to continue the enterprise culture, however, funding for start-ups was still difficult until about 2014 (Hart and Levie 2010; Hart, Levie, Bonner, and Drews 2014).

The effects of the Great Recession were felt globally, with a decrease in the overall entrance to self-employment (Levie and Hart 2009; Hart and Levie 2010).

Regarding the United States and United Kingdom, the economic outcomes differed. For example, the United Kingdom was only minimally affected, maintaining a higher average of TEA than the G7 countries average during the same time (Levie and Hart 2009). On the other hand, it took the United States until 2013 to get back to pre-financial crisis economic stability (Ali et. al. 2010; Weinberg 2013). However, by 2014 the United States had a 9.7% entrance rate to self-employment, while the United Kingdom, ahead of the European benchmark countries, was only at 4.9% (Hart, Levie, Bonner, and Drews 2014).

#### *United Kingdom and United States: 2020*

In 2020, the world experienced a global pandemic known as the novel Coronavirus, or COVID-19. This economic crisis included many business closures, loss of jobs, and spikes in unemployment (Bosma et. al. 2021; Hill et. al. 2022). For example, business closures increased from 2.1% to 3.6% in the UK and 2.9% to 4.4% in the US (Hart et al. 2019; Hart et al. 2020). In the United States there was a dramatic spike in unemployment to 13% in the second quarter and back down to 6.7% by the end of the year (Smith, Edwards, and Duong 2021). However, in the United Kingdom, unemployment was steadier, only increasing from 3.74% in 2019 to 4.9% in October 2020 and then averaging 4.47% at the end of the year (Office for National Statistics 2020).

In this study, the United States had a positive coefficient, and the United Kingdom had a negative coefficient for the interactive variable ( $y20unempl$ ). This indicates a refugee-push in the United States and a propensity-pull in the United Kingdom for entrance into self-employment. These results are consistent with the

national GEM reports for each country showing a decrease in TEA in the US and UK from 17.4% in 2019 to 15.4% in 2020, and from 9.9% in 2019 to 7.5% in 2020, respectively (Hart et al. 2020; Kelley, Brush, Corbett, and Majbouri 2020). For example, it was reported that half of entrepreneurs in the US entered self-employment out of necessity, which was up from 22% in 2019, while half of the entrepreneurs in the UK saw entrance to self-employment as an opportunity, which was up from 39.1% in 2019 (Hart et al. 2020; Kelley et al. 2021). However, while entrepreneurial aspirations were high, it was more difficult to start and/or maintain a business during the pandemic due to the increased difficulty in procuring funds from long wait times (Hart et al. 2020; Kelley et al. 2021).

*United States government response.* The Federal Reserve System, known as the Fed, immediately cut the federal funds rate 1.5% to nearly zero, and kept that rate as low as possible until the economy recovered (Kelley et al. 2021). Additionally, the federal government implemented a stay-at-home order beginning in mid-March (Kelley et al. 2021). This caused a lot of storefront locations of businesses to close their doors, and people to go home with no income (Smith, Edwards, and Duong 2020; Kelley et al. 2021). However, considering many Americans lost their jobs when businesses closed, the need for benefits in the unemployment sector and the savings rate increased (Kelley et al. 2021).

Temporary funding programs like the Paycheck Protection Program (PPP) Liquidity Facility and the Main Street Lending Program were implemented by the Fed to provide payroll support to small and medium sized businesses, at a low interest rate, to keep their employees on payroll (Kelley et al. 2021). If necessary, businesses could apply

for funds a second time and either part or all of the loan could be forgiven (Kelley et al. 2021). However, with so many claims at one time, there was a delay with the Small Business Administration (SBA) allocating funds, causing an increase in the unemployment rate (Kelley et al. 2021).

Another funding program passed by Congress and signed into law by President Trump in March 2020 was the Coronavirus Aid, Relief, and Economic Security (CARES) Act (Kelley et al. 2021). The CARES Act was implemented to supply one-time cash payments to Americans who reported adjusted gross income of up to \$99,000 (or \$198,000 for married couples filing jointly) on their tax returns. Most single individuals received a stimulus of \$1,200 and additional funds were allocated for those with children (Kelley et al. 2021). The stimulus was intended to create an increase in economic activity. This began with the savings rate increasing by 33.7% from stimulus checks, and coupled with unemployment benefits, which equaled \$260 billion of the CARES Act, resulted in an increase in purchasing power, thereby increasing spending throughout 2020 (Kelley et al. 2021).

*United Kingdom government response.* As with the US, the UK issued a stay-at-home order for all citizens to quell the spread of the virus (Evandrou, Falkingham, Qin, and Vlachantoni 2020). The UK government implemented both business and employee specific programs to support the economy (KPMG 2020; House of Commons 2023). For example, on the business side, the UK government immediately implemented the Self-Employment Income Support Scheme (SEISS), which initially paid taxable grants worth 80% of someone's average monthly trading profit, for a three-month period. There were five total rounds of the SEISS program.

The first round was from April to June 2020, where those claiming SEISS could receive a grant up to £7,500 (\$9,618) in total. The second round was from May to October 2020, where those claiming could receive 70% of their average monthly trading profit, for a further three months, capped at £6,570 (\$8,425) in total. The third round was from November 2020 through January 2021, where those claiming could receive 80% of their average trading profits, up to £7,500 (\$9,618) in total. The fourth round was from February to April 2021, where those claiming could receive 80% of three months' average trading profits, capped at £7,500 (\$9,618), for those with a turnover reduction of 30% or more or 30% of three months' average trading profits, capped at £2,850 (\$3,655), for those with a turnover reduction of less than 30%. The fifth, and final, round was an extension from May to September 2021, which tightened the requirements on receiving the grant, based specifically on trading profits turnover and need (House of Commons 2023).

However, on the employee side, the UK government implemented the Job Retention Scheme (JRS), which provided employers with funds to keep employees who were furloughed due to the pandemic (KPMG 2020). This applied to all countries in the United Kingdom. However, there were other schemes implemented in specific countries. For example, in England, Scotland, and Wales the Kickstart program provided people aged 16-24 with government assistance to cover the cost of the first six months of employee's wages, at minimum wage for 25 hours a week. Additionally, the government covered the associated employer National Insurance contributions and minimum automatic enrollment pension contributions. England implemented the Apprentice Scheme, which provided apprentices aged 16-24 £2,000 (\$2,565) and those 25 or older

with £1,500 (1,924) beyond the initial government stimulus of £1,000 (\$1,282). It also implemented the Trainee Scheme, which provided a business £1,000 (\$1,282) for each new trainee they hired. The UK also implemented the Statutory Sick Pay (SSP) for small and medium sized businesses with 250 employees or less, which supplemented up to two weeks of sick leave for employees (KPMG 2020).

Both the US and UK governments immediately reacted to the COVID-19 pandemic crisis. However, the extent of that support was significantly different. On one hand, regarding small business owners, the Coronavirus Business Interruption Loan Scheme (CBILS) in the UK provided businesses with an interest-free loan for 12 months under a British Business Bank (BBB) scheme. This scheme includes the UK government providing lenders with a guarantee for 80% of each loan (subject to a per-lender cap on claims) and covers the cost of the first 12 months of interest (KPMG 2020). Additionally, SMEs specific to research and development could receive additional funding during this time. For those SMEs that needed help bouncing back from the crisis, the Bounce Back loan, worth up to 25% of turnover, included a maximum payment of £50,000 (\$64,120) and access to cash within days. The government also provided this loan with a 100% guarantee and paid the fees and interest for up to 12 months. Also, the Pay as you Grow plan extended the payback period from 6 to 10 years (KPMG 2020).

On the other hand, the US government, in addition to the payroll protection program, implemented the American Rescue Plan for small businesses and the Emergency Capital Investment Program provided added support (U.S. Department of the Treasury 2023). The American Rescue Plan extended the Employee Retention Credit for small businesses through December 2021. This plan allowed businesses to offset their



current payroll tax liabilities by up to \$7,000 per employee per quarter. This credit was available to small businesses with declining revenues or were shut down, due to COVID, and also included a tax credit of up to \$5,000 per employee and a paid leave, dollar-for-dollar tax credit, equal to wages of up to \$5,000 if the company offered paid leave to employees who were sick or quarantining. This benefit was in addition to the PPP (U.S. Department of the Treasury 2023).

Additionally, the US Treasury provided up to \$9 billion in capital directly to depository institutions that are certified Community Development Financial Institutions (CDFIs) or minority depository institutions (MDIs) to support the Emergency Capital Investment Program (ECIP). This program encouraged low- and moderate-income community financial institutions to provide loans, grants, and forbearance for small businesses, minority-owned businesses, and consumers, especially in low-income and underserved communities, that may be disproportionately impacted by the economic effects of the COVID-19 pandemic (U.S. Department of the Treasury 2023).

However, while both countries aided their citizens with stimulus checks and grants to businesses to maintain their status; the UK went above and beyond to meet the specific needs of their people. Another example includes the UK's already extensive statutory government leave of 28 days, which was allowed to be extended for up to two years. This means that all government holidays provided to employees that were not used due to COVID could be rolled over for the next two years. Additionally, there were plans in place specifically for employees at certain ages, in certain employment roles, and those sent home on leave without pay (KPMG 2023).

## Conclusion

This essay utilized the method of ordinary least squares (OLS) estimates, the fixed and random effects models, and a comparative analysis between the United States and United Kingdom to assess the factors that affect self-employment after an economic shock. This study found shock years alone do not significantly affect self-employment, however, when interacted with unemployment there is a significant change in the structure of the motivation to enter self-employment in both the United Kingdom and the United States. This structural change is evident in the shock years of 1981, 1993, 2009, and 2020 in the United Kingdom and 1975, 1982, 2009, and 2020 in the United States. Additionally, when these two countries are combined, the model was unbalanced due to insufficient consistent data, and provided a random effects model. This indicates that while the two countries are different, their difference itself affects self-employment, but does not affect the independent variables (Torres-Reyna 2007).

In the United Kingdom, the interaction variables (*y81unempl*, *y93unempl*, *y09unempl*, and *y20unempl*) provided opposite coefficient signs, indicating a change from a push into self-employment (positive coefficient) to a pull into self-employment (negative coefficient). It was found that the motivation to enter self-employment in the United Kingdom before the recession from 1979-1983 was due to a propensity-pull effect. However, in 1981, the structure of motivation changed from a propensity-pull to a refugee-push. This is cited as being due to the recession from 1979-1983, which prompted the Thatcher administration to implement policies that encouraged enterprise culture in the UK (Meager 1992). To combat the rise in unemployment in the UK, incentive programs like the Enterprise Allowance Scheme provided funds to people to

start a business rather than be unemployed (Meager 1992; Office of National Statistics 2014). This caused the fastest growth in self-employment in the European Community countries from 1979 to 1988 (Meager, Kaiser, and Dietrich 1992).

Then, in 1993, the motivation switched back to a propensity-pull effect, shown by the negative coefficient of the variable (*y93unempl*) (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018). There were several economic disturbances that could be attributed to this change, including the 1992 Sterling crisis and the recession of the early 1990s. The Sterling crisis was the result of the UK's forced withdrawal of sterling from the European Exchange Rate Mechanism (Eichengreen and Hsieh 1995). This withdrawal was a combination of Sterling being overvalued against other currencies, hesitation to increase interest rates to counter the fall, and an increase in unemployment (Eichengreen and Hsieh 1995). The recession in the early 1990s prompted the rise in unemployment and decrease in economic productivity, which resulted in a decrease in wage employment and provided an opportunity for an increase in self-employment (Meager, Kaiser, and Dietrich 1992; Office for National Statistics 2014).

In 2009, the motivation switched back to a refugee-push with a positive coefficient of the *y09unempl* variable. This is indicative of the 2007-08 financial crisis, which caused the deepest recession since World War II and included high rates of unemployment, debt, and many home repossessions (Allen 2010; UK Commission for Employment and Skills 2014). This resulted in an overall decrease in output, which caused the GDP to consistently fall from mid-2008 to late 2009 (Allen 2010). Self-employment rates increased during this time, which was a result of the refugee-push

effect as people were looking for an option other than unemployment (UK Commission for Employment and Skills 2014; Giupponi and Xu 2020). The UK government implemented policies including the New Enterprise Allowance Scheme, Local Enterprise Partnerships, Regional Growth Funds, and Coaching for Growth initiative (Hart and Levie 2010). These programs were intended to facilitate growth and assist the economy to continue the enterprise culture (Hart and Levie 2010; Hart, Levie, Bonner, and Drews 2014).

Last, in 2020, the motivation changed again to a propensity-pull, which is shown by the negative coefficient of the *y20unempl* variable. In 2020, the world experienced the COVID-19 global pandemic. This economic crisis included many business closures, loss of jobs, and spikes in unemployment (Bosma et. al. 2021; Hill et. al. 2022). However, in the United Kingdom, unemployment was steadier, only increasing from 3.74% in 2019 to 4.9% in October 2020 and then averaging 4.47% at the end of the year (Office for National Statistics 2020). This is indicative of the UK government implementing both business and employee specific programs to support the economy (KPMG 2020; House of Commons 2023). These programs included the Self-Employment Income Support Scheme (SEISS), the Job Retention Scheme (JRS), the Kickstart program, National Insurance contributions and minimum automatic enrollment pension contributions, the Apprentice Scheme, the Trainee Scheme, and the Statutory Sick Pay (SSP) for small and medium sized businesses (KPMG 2020; House of Commons 2023).

The back-and-forth changes to the motivation in the United Kingdom can be attributed to policy implementation and political party agendas. For example, the Thatcher administration pushed for enterprise culture in the late 1970s to early 1980s,

encouraging the unemployed to move to self-employment by supplying financial support (Taylor 2004). However, by the late 1980s to early 1990s, policies supporting non-agricultural advancement, as well as women in the self-employment sector provided an opportunity motivator to enter self-employment (Taylor 2004).

The United States, on the other hand, did not have a structural change in the entrance to self-employment. Instead, the coefficients were positive in all four shock years (*y75unempl*, *y82unempl*, *y09unempl*, and *y20unempl*) indicating a refugee-push as the motivation to enter. The consistent refugee-push effect on the motivation to enter self-employment in the United States can be attributed to the drastic spikes in unemployment, coupled with the lack of consistent long-term financing for the self-employed (Abraham and Schmukler 2017; Brown and Lee 2017; The World Bank 2023). For example, the 1975 shock year could be due to President Nixon ending the gold standard in 1971, the Organization of the Petroleum Exporting Countries (OPEC) embargo in 1973 followed by an increase in inflation in 1974, and economic contraction in 1975 (Amadeo 2021). During these times, unemployment increased, which is typically followed by a counter-cyclical relationship with self-employment (Bögenhold and Staber 1991; Meager 1992). However, Bögenhold and Staber (1991) discuss Steinmetz and Wright's (1989) findings that over time, the counter-cyclical relationship fades and transitions to a positive relationship. This study verifies the latter with positive coefficients in all four shock years (1975, 1982, 2009, and 2020).

The shock year of 1982 is indicative of the recession from July of 1981 through November 1982, which was a result of the implementation of monetary policy to decrease inflation (Sablik 2013). This policy included increasing interest rates, which

also caused an increase in unemployment, subsequently causing an increase in self-employment (Meager 1992; Bryant, Hooper, and Mann 1993; Taylor 1993; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019; Reynolds, Hay, and Camp 1999).

The 2009 shock year is due to the 2007-08 financial crisis, which resulted in an increase in unemployment, a decrease in GDP, and interest rates hitting their floor (Weinberg 2013). This caused a decrease in maintaining businesses (EBO), even though nascent entrepreneurs saw the economic downturn as an opportunity to make money. However, with a decrease in initial public offerings of venture-backed companies, the total entrance to self-employment declined in 2009 (Ali et. al. 2009). This led to government program implementations both for individuals and corporations (Weinberg 2013). For individuals, Fannie and Freddie Mac were taken over by the U.S. government to aid in the housing market (Weinberg 2013). On the corporate side, the Dodd-Frank Wall Street Reform and Consumer Protection Act was implemented to improve accountability and transparency in the financial system, to protect the American taxpayer by ending bailouts, and protect consumers from abusive financial services practices (Goodwin 2010).

In 2020, the world experienced the global COVID-19 pandemic causing many business closures, loss of jobs, and spikes in unemployment (Bosma et. al. 2021; Hill et. al. 2022). For example, in the United States there was a dramatic spike in unemployment to 14.7% in the second quarter and back down to 6.7% by the end of the year (Smith, Edwards, and Duong 2021). This resulted in half of entrepreneurs in the US entering self-

employment out of necessity, which was up from 22% in 2019 (Hart et al. 2020; Kelley et al. 2021). In response to the pandemic, the Fed immediately cut the federal funds rate of 1.5% to nearly zero and kept that rate as low as possible until the economy recovered (Kelley et al. 2021). Additionally, the federal government implemented a stay-at-home order beginning in mid-March (Kelley et al. 2021). This caused a lot of storefront locations of businesses to close their doors, and people to go home with no income (Smith, Edwards, and Duong 2020; Kelley et al. 2021). However, considering many Americans losing their jobs when businesses closed, the need for benefits in the unemployment sector and the savings rate increased (Kelley et al. 2021). To combat this, programs like the Paycheck Protection Program (PPP) Liquidity Facility and the Main Street Lending Program were implemented by the Fed to provide payroll support to small and medium sized businesses, at a low interest rate, to keep their employees on payroll (Kelley et al. 2021). Another funding program was the Coronavirus Aid, Relief, and Economic Security (CARES) Act, implemented to supply one-time cash payments to Americans who reported adjusted gross income of up to \$99,000 (or \$198,000 for married couples filing jointly) on their tax returns (Kelley et al. 2021).

While entrepreneurial aspirations in the US were high during each of these shock years, where those seeking to start a business saw the opportunity being a business owner can bring, the lack of funding to begin the self-employment process causes hesitance and uncertainty (Schneider 1997; Schneider, Buehn, and Montenegro 2010; Omri 2020). Instead, there are programs implemented on the back end of economic crises to support Americans after job loss or disturbance. For example, even though there were programs in place to assist in business funding, it was more difficult to start and/or maintain a

business during the pandemic due to the increased difficulty in procuring funds from long wait times (Hart et al. 2020; Kelley et al. 2021). Therefore, entrance to self-employment was put off until there was no other option, or only sought out as a second income to supplement the first (Scott, Edwards, and Stanczyk 2020).

The combined panel model proved that there was not a significant difference between the US and UK, which was confirmed in the OLS model and by the Hausman test. The model was concluded to be a random effects model, which means that the variation across the US and UK are uncorrelated and random regarding the independent variables (Torres-Reyna 2007). Additionally, this means that the difference between the US and UK has an influence on entrance to self-employment, but this difference is not correlated with the independent variables (Torres-Reyna 2007). The significant variables in the combined model were the lag of self-employment and the political party in office. The comparative analysis between the US and UK shows that the two countries have distinct differences regarding entrance to self-employment, and the implementation of government policies was a driving force. For example, the US has a rigid unemployment rate in times of economic crisis, where the UK has a smoother transition as it increases and decreases. Another example is the extent to how policies are implemented during times of economic crisis. While the extent itself is not measured in this study, it could be captured in the distribution of support, specifically funds, regarding how the funds are distributed and to whom.

It is noted that there are limitations to this study, which includes the omission of significant variables due to the lack of data and/or access to the data. For example, in the United Kingdom, the self-employment tax rate and government allocation for small and



medium sized enterprises (SMEs) could provide a more robust perspective of how policy implementation plays a role in the motivation to self-employment (Hibbs 1977; Akard 1992; Reynolds, Hay, and Camp 1999; Hipple 2004; Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019). Additionally, including specific data on inflows to and outflows from self-employment, as well as income data and how it can affect inflows and outflows can provide a narrower view of if the outflow from self-employment is due to business closure or progression to entrepreneurship (Meager 1992; Taylor 2001).

## CHAPTER IV – ESSAY 3: GLOBAL ENTREPRENEURSHIP MONITOR DATA

### Introduction

This essay assesses the Global Entrepreneurship Monitor (GEM) data from its beginning in 1999 through 2018 to analyze entrepreneurship on a global scale. The Global Entrepreneurship Monitor (GEM) began in 1997 as a partnership between Babson College in the United States and the London Business School in the United Kingdom. The GEM is a global research team that performs survey-based research on individual and country-level entrepreneurship (Reynolds, Hay, and Camp 1999). It is the largest ongoing study of entrepreneurship in the world and is made up of networked-national country teams associated with top academic institutions (Reynolds, Hay, and Camp 1999). The GEM data is collected through the Adult Population Survey (APS), which focuses on individuals as panels of observation and collects information on entrepreneurial motivations, aspirations, and characteristics (GEM 2022c). This survey is administered to at least 2,000 individuals in each participating country to collect information on the entrepreneurial activity, attitudes, and aspirations of the respondents (GEM 2022c).

Entrepreneurship is defined as a factor to economic growth by providing an increase to a country's gross domestic product (GDP) (Reynolds, Hay, and Camp 1999; Thai and Turkina 2014). It is considered a crucial factor of a society's health and wealth by promoting innovation from new opportunities, productivity, and employment (GEM 2022b). It is further described as a new business, or venture, like self-employment, a new business organization, or an expansion of an existing business by an individual, team of individuals, or established businesses (Reynolds, Hay, and Camp 1999). The GEM model

of entrepreneurship includes a view of new business opportunity with two categories: the total early-stage entrepreneurial activity (TEA), which includes start-ups and businesses up to 3 and a half years old, and established business owners (EBO), which includes businesses over 3 and a half years old (GEM 2022c).

The analysis in this study includes OLS regressions on time series data from the APS from 2002 to 2018. The dependent variable of this study is the self-employment rate, and the independent variables include gender, age, educational attainment, current work status, the lag of work status, country status, motive to enter self-employment, income, the shock year of 2009, the MIMIC score, number of established businesses, and the country's region. This study found that people are more likely to enter self-employment if they are in the 45-54 age category, have an undergraduate education, and were self-employed in the previous year. Additionally, the geographical location of a country, country status (more developed or less developed), and the shock year of 2009 also play a role in determining entrance into self-employment.

It is noted that there are limitations to this study including limited access to current data. First, the GEM only releases data after a three-year delay. For example, the latest data currently available is 2018 while the reports on the data are current through 2023. Second, further comparisons between TEA and EBO could provide a clearer picture on the outflow from self-employment and the inflow to establish business ownership (Meager 1992; Schneider 1997; Cullen, Johnson, and Parboteeah 2014; Reynolds, Hay, and Camp 1999; Center for American Entrepreneurship 2022). Last, this study focused on the shock year of 2009 to validate its effect globally. In doing so, only

countries that had 3 or more years of data and those that included the shock year 2009 were included in this study. That decreased the size of the study from 114 countries to 50.

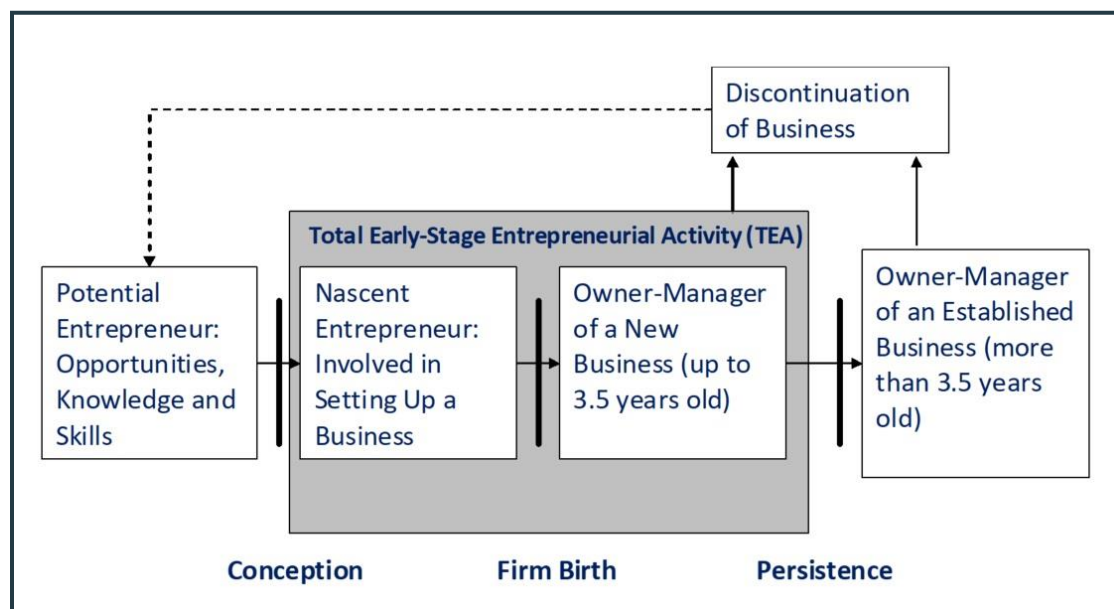
## Literature Review

### *Entrepreneurial process*

The GEM defines entrepreneurship as an attempt to start a new business or venture, including self-employment, an organization, or expansion of an existing business by an individual or group or individuals (Reynolds, Hay, and Camp 1999). The main economic factors that the GEM uses in determining entrance into the entrepreneurial process include gender, age, educational attainment, current work status, household income, and access to funding (Minniti, Bygrave, and Autio 2005). However, other indicators have been incorporated over the years including years of economic shock, geographical location, inclusion of special topic questions on the APS, the addition of the GEM Entrepreneurial Spirit Index (GESI), and a move to focus more on perceptions on motivation to enter the entrepreneurial process (Minniti, Bygrave, and Autio 2005; Bosma et. al. 2008; Kelley, Bosma, and Amorós 2010; GERA 2018). The GEM identifies that people who enter the entrepreneurial process as self-employed are typically older males who have an educational level of at least a high school diploma, access to business start-up funds, live in less developed (developing) countries, and start a business out of necessity (Bosma et. al. 2008; Kelley, Bosma, and Amorós 2010; Xavier et. al. 2012).

The GEM defines the entrepreneurial process as a three-phase process: conception, firm birth, and persistence (GEM 2022a). The conception phase includes forethought of people that want to enter the process. The firm-birth phase includes the self-employed and owner-managers. The self-employed in the entrepreneurial process are

defined as nascent entrepreneurs, or those people that have just begun the self-employment journey as a startup business. The owner-managers are those who are beyond the initial start-up process but have had a business for less than three and a half years (GEM 2022a). The start-up phase and management phase of a business, up to three and a half years, is known as the total early-stage entrepreneurial activity (TEA) (Reynolds, Hay, Bygrave, Camp, and Autio 2000; GEM 2022a). The businesses that are beyond the three-and-a-half-year mark are identified as established business owners (GEM 2022a).



*Figure 3.1. GEM model of Entrepreneurship*

Source: Data from GEM 2022c, accessed September 28, 2022, <https://www.gemconsortium.org/wiki/1149>.

### *Entrepreneurship*

Entrepreneurship is identified as a factor to economic growth by providing an increase to a country's gross domestic product (GDP) (Reynolds, Hay, and Camp 1999; Thai and Turkina 2014). The GEM states that an economy's success is dependent on the entrepreneur sector of employment and the increased entrance into the process (self-

employment) plays a key role (Kelley, Bosma, and Amorós 2010). Entrepreneurship is more prevalent in developing economies due to the decrease in barriers to entering the entrepreneurial process (Acs, Arenius, Hay, and Minniti 2004; Omri 2020). These barriers include government regulations, taxation, and financial barriers (Wujung and Fonchamnyo 2016; Omri 2020). However, entrepreneurs thrive more in developed economies due to stronger economic and financial systems (de Soto 2001; Kelley, Bosma, and Amorós 2010).

These barriers to entrance can also cause an increase in people entering the informal economy. The informal economy includes institutional socioeconomic factors including historical culture, traditions, and appropriate behavior as defined by a society (Freedström, Peltonen, and Wincent 2021). Another name for the informal economy is the shadow economy, which is driven by the increase in taxation, labor market regulations, and quality of public goods and services (Schneider 1997; Schneider, Buehn, and Montenegro 2010). These institutions can encourage and block progress in the entrepreneurial cycle, which depends on the severity (size) of the informal economy (Schneider 1997; Cullen, Johnson, and Parboteeah 2014). Increased implementation of government policies like taxes and government regulations leads to an increase in the informal economy size (Schneider 1997; Cullen, Johnson, and Parboteeah 2014; Freedström, Peltonen, and Wincent 2021). Therefore, the size of a country's informal economy determines if and how much government policy implementations will affect self-employment (Freedström, Peltonen, and Wincent 2021).

### *Self-employment*

Entrance into self-employment, the nascent entrepreneur level of entrepreneurship, is described as a cyclical relationship that depends on the state of the economy when the decision to move to self-employment is made (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Baker, Égert, Fulop, and Mourougane 2018). This relationship is often explained by the business cycle, which includes the expansion of an economy during times of prosperity (a boom) and contraction of an economy during economic downturns (recession) (Burns and Mitchell 1946; Lucas 2003; Benedict and Hakobyan 2008). When the business cycle contracts (recession), the rise in unemployment leads people to choose self-employment out of necessity (Benedict and Hakobyan 2008). On the other hand, when a recession occurs and businesses shut down, it lowers the price of capital equipment and provides an opportunity for new business ventures (Benedict and Hakobyan 2008).

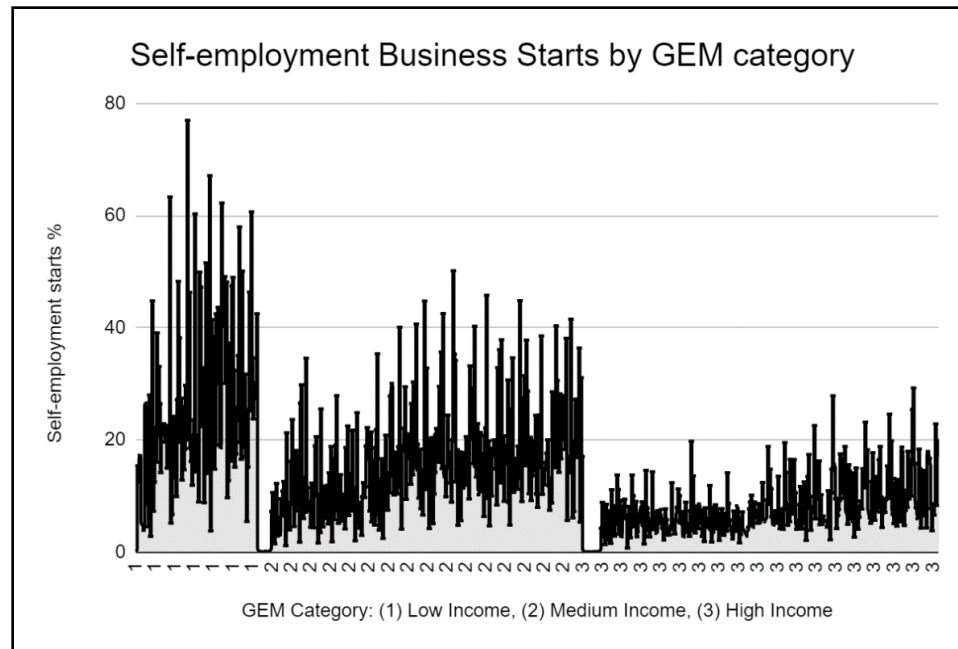
The motivation to enter the self-employment phase of the entrepreneurial process is either as a last option for employment (necessity) or seen as an opportunity to make money (propensity) (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Congregado and Golpe 2011; Horta, Meoli, and Vismara 2015; Baker, Égert, Fulop, and Mourougane 2018). The former is defined as a refugee-push hypothesis, which states that people will enter self-employment as a survival strategy when there is not an alternative income available. Therefore, in times of economic downturn, people (who are typically unemployed at the time) will turn to self-employment as a last resort for income (Meager 1992; Benedict and Hakobyan 2008; Garba 2012). GEM adds that there is a higher rate of the self-employed in less developed

countries because they are pushed to find employment (Reynolds, Hay, Bygrave, Camp, and Autio 2000; Acs, Arenius, Hay, and Minniti 2004; Minniti, Bygrave and Autio 2005; Kelley, Bosma, and Amorós 2010). For example, the 2004 GEM report found that as countries moved from the middle-income category to the high-income category, entrance into self-employment based on necessity decreases (Acs, Arenius, Hay, and Minniti 2004).

The alternative motivation to entering self-employment is when people see it as an opportunity to be innovative and make more money, which is defined as the propensity-pull hypothesis (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; OECD 2022d). However, the GEM states that while people in more developed countries are more likely to enter self-employment due to propensity-pull, they also have a lower rate of self-employment entrance (Reynolds, Hay, and Camp 1999; Acs, Arenius, Hay, and Minniti 2004; Minniti, Bygrave and Autio 2005; Kelley, Bosma, and Amorós 2010).

Figure 3.2 provides a graphical example of entrance into self-employment based on business starts in each year. From left to right the chart signifies the three GEM categories of income (low, middle, and high). This chart is consistent with the 2005 GEM report, which indicates that lower per capita GDP countries have a higher entrance into TEA (Minniti, Bygrave, and Autio 2005).





*Figure 3.2. Self-employment by GEM category of income (low, medium, and high)*

Source: Data from GEM 2022c, accessed September 28, 2022, <https://www.gemconsortium.org/wiki/1149> and OECD 2022d, assessed <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/unemployment/timeseries/mgsx/lms> (Accessed November 15, 2022).

### *Global Entrepreneurship Monitor (GEM)*

The Global Entrepreneurship Monitor consists of 60 nations governed by the Global Entrepreneurship Research Association (GERA) in England and Wales that aims to research entrepreneurial activity through the values of integrity, innovation, and excellence (GEM 2022b). The focus of this organization is to identify the factors that affect entrance into the self-employment process, track progression through the entrepreneurial process, and provide perspective on the relationship between entrepreneurship and economic progress (Reynolds, Hay, and Camp 1999; Bosma et al. 2008; Bosma and Levie 2009; Bosma et al. 2021).

Each year the GEM reports emphasize countries and their economic factors that were most prevalent in that year. For example, the first entrepreneurial study by the GEM

team began in 1999 with 10 countries split into levels of entrepreneurial activity: the United States, Israel, and Canada were in the high category averaging 6.9 percent, Italy and the United Kingdom were in the medium category averaging 3.4 percent, and Denmark, Finland, France, Germany, and Japan were in the low category averaging 1.8 percent (Reynolds, Hay, and Camp 1999). However, the most current study released in 2023 includes 50 countries categorized by their per capita GDP including level A, which is over \$40,000, level B, which is between \$20,000 and \$40,000, and level C, which is below \$20,000 (Hill et. al. 2023).

The GEM data as a whole is separated into two categories: Entrepreneurial Behaviour and Attitudes, which focuses on the APS characteristics and Entrepreneurial Framework Conditions, which utilizes the National Expert Survey (NES) that includes ratings from experts around the world that look at the national context in which people start businesses (GEM 2022a). The GEM yearly global reports center on the Entrepreneurial Behaviour and Attitudes data from the APS and hone in on specific characteristics each year that are reflective of all the economies' reactions to those indicators (Reynolds, Hay, and Camp 1999).

For example, in the reports from 1999 through 2003 the countries were divided into regions and entrepreneurial activity (Reynolds, Hay, and Camp 1999; Reynolds et. al. 2000; Reynolds et. al. 2001; Reynolds et. al. 2002; Reynolds, Bygrave, and Autio 2003). In 2004, the focus shifted to income levels (low, medium, and high) of per capita GDP (Acs, Arenius, Hay, and Minniti 2004). In the reports for 2005 through 2007 the levels shifted to only include medium and high per capita GDP as the low and medium groups were combined (Minniti, Bygrave, and Autio 2005; Bosma and Harding 2006;

Bosma, Jones, Autio, and Levie 2007). In the 2017/2018 report the GESI indicator was introduced (GERA 2017). From 2008 through 2020, the countries were divided into the factor-driven, efficiency-driven, and innovation-driven categories that paralleled the low, medium, and high per capita GDP levels, respectively (Bosma et. al. 2008; Bosma and Levie 2009; Kelley, Bosma, and Amorós 2010; Kelley, Singer, and Herrington 2011; Xavier et. al. 2012; Amorós and Bosma 2013; Singer, Amorós, and Arreola 2014; Kelley, Singer, and Herrington 2015, 2016; GERA 2017; GERA 2018, Bosma and Kelley 2019; Bosma et. al. 2020). In 2021 through 2023, the levels flipped to indicate high income first (A), then medium (B), and then low (C) (Bosma et. al. 2021; Hill et. al. 2022; Hill et. al. 2023).

## Data and Methods

### *Data - Variables*

This essay utilizes OLS regressions on GEM data from 2002 to 2018 to assess the factors that affect self-employment on a global scale. The dependent variable is the self-employment rate, which is the number of self-employed divided by the total employed population, and the independent variables, which includes gender (*Gen*), (*Age*), educational attainment (*EA*), work status (*WS*), country status (*CS*), motivation to enter self-employment (*Motive*), income (*I*), the informal economy (*IE*), (*Shocks*) to the economy, geographical location (*GL*), and number of established businesses (*NBO*).

$Gen_{ijt}$  is the percentage of respondents that are male and percentage of respondents that are female and is included to identify if males are still more likely to enter self-employment than females (Noorderhaven et al. 1999; Rissman 2003; Fairlie 2005; Nikolova and Bargar 2010; Dvouletý and Lukeš 2016).  $Age_{ijt}$  is the percentage of

people in each age category (18-24, 25-34, 35-44, 45-54, and 55-64) involved in TEA, and is used to determine if the older category, those close to or in retirement age, are still most likely to enter self-employment (Earle and Sakova 2000; Rissman 2003; Nikolova and Bargar 2010; Dvouletý and Lukeš 2016). Educational attainment ( $EA_{ijt}$ ) is the number of adults per 100 at the highest level of education attained within each category and is used to determine if an increase in education decreases the entrance into self-employment. Educational attainment usually has an inverse relationship with self-employment (Earle and Sakova 2000; Nikolova and Bargar 2010; Borjas 2013; Dvouletý and Lukeš 2016; Hipple and Hammond 2016). The GEM identifies four categories of education on the APS: some secondary education, secondary education graduate, undergraduate education, and graduate education (GEM 2022c).

The  $Shocks_t$  variable is included to determine if the shock year, which is identified as 2009, has an effect on self-employment. A year is included as a shock year if the unemployment rate from the previous year decreases by one standard deviation or higher. This is additionally verified by a one standard deviation of the difference in GDP per capita growth from year to year. The  $Shocks_t$  variable is identified as an indicator variable with (1) meaning there was a shock in that year and (0) otherwise. In previous studies, 2009 is identified as a *shock* year due to calculations of the unemployment rate and GDP. This stems from the 2007-2008 financial crisis in the United States, which could be an exogenous, or an external factor, for countries around the world.

Work status ( $WS_{it}$ ), which is the percent yes to the question on if the person was wage employed when they entered self-employment, is included to determine if people were wage-employed in the year they entered self-employment. The work status in the

previous year ( $WS_{it-1}$ ) is also included to determine if people were wage-employed in the previous year before entering self-employment. A negative, or inverse, relationship in either variable would mean that people left wage-employment and entered self-employment (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012). However, if the relationship is positive, it could signify dual employment in both wage and self-employment, meaning that people are supplementing their income (Scott, Edwards, and Stanczyk 2020).

Country status ( $CS_{it}$ ) is included to determine if a country's development status affects entrance into self-employment. GEM separates countries into three categories: Factor-driven, or low income, with a GDP per capita lower than \$20,000, efficiency-driven, or middle income, with a GDP per capita between \$20,000 and \$40,000, and innovation-driven, or high income, with a GDP per capita above \$40,000 (Hill et. al. 2023). Therefore, the  $CS$  variable will be broken into two categories of dummy variables,  $g_{i1}$  and  $g_{i2}$ , where the factor-driven category is the base category and  $g_{i1}$  is efficiency-driven, and  $g_{i2}$  is innovation-driven. Garba (2012) found that a country's status has a positive relationship with developed countries and a negative, or inverse, relationship with developing countries. This is attributed to developed countries having a higher wage-rate, which increases the opportunity for wage employment and can decrease entrance to self-employment (Akerlof and Shiller 2009; Borjas 2013; Hill et. al. 2023). This assertion is tested for the shock year of 2009.

Motivation ( $Motive_{ijt}$ ) to enter self-employment, which is the percent yes to the question of the motivation to enter self-employment within each category, is used to determine if the decision is based on the refugee-push or propensity-pull hypothesis.

$MotiveNec_{it}$  and  $MotiveOpp_{it}$  are used to identify a refuge-push and propensity-pull, respectively. If the coefficient for either variable is positive, then there is a positive relationship and if the coefficient is negative then there is an inverse relationship (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; OECD 2022). Income ( $I_{ijt}$ ) has three categories ( $TEALowIn_{it}$ ,  $TEAMidIn_{it}$ , and  $TEAHiIn_{it}$ ), which is the percentage of respondents that are currently in each income category, is used to determine which share of income (bottom 33%, middle 33%, and top 33%) includes the most people that enter self-employment. It is identified that those who have more resources (income) available to them will be more likely to enter self-employment (Meager 1992; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Watson and Kaeding 2019).

Established business ownership (EBO) is the number of people in the adult working population that are currently owners of a business that has paid wages or other payments to owners for 42 months or longer (Bosma et al. 2021). The number of established businesses in a given year ( $NumEstBus_{it}$ ), which is the number of businesses that were established in each year, is used as a proxy for EBO since there could be more than one owner of an establishment. Using the number of businesses determines the progression of the business through the entrepreneurial cycle. High rates of the number of established businesses indicate positive conditions for firm survival when there is a positive relationship between  $NumEstBus_{it}$  and self-employment (Bosma et al. 2008).

The informal economy is used to determine if entrance to self-employment is affected by a country's informal economy size. Freedström, Peltonen, and Wincent

(2021) state that there should be a negative relationship between self-employment and the informal economy. This results from an increase in the tax burden and government regulations (policies), which leads to an increase in the informal economy size (Schnieder 1997). The informal economy will be proxied by utilizing ( $mimic_{it}$ ), the multiple indicator-multiple cause (MIMIC) approach, which relies on tax burden, institutional quality, openness to trade, unemployment, currency use, labor force participation, and the size of the economy to determine the MIMIC score (Medina and Schneider 2019).

Gross domestic product (GDP) per capita growth, which is the gross domestic product divided by the midyear population, is added as an indicator of economic growth, which is linked to an increase in entrepreneurial activity (Meager 1992; Reynolds, Hay, Bygrave, Camp, and Autio 2000; Thai and Turkina 2014; Hipple and Hammond 2016; Krueger 2020). Therefore,  $GDPPCG_{it}$  is used to capture this growth. The unemployment rate ( $unempl_{it}$ ), which is the number of the unemployed divided by the total working age population (18-64), is added to determine whether the relationship between self-employment and unemployment is pro- or counter-cyclical. A pro-cyclical, or positive, relationship would indicate entrance to self-employment was out of necessity. However, a counter-cyclical, or negative, relationship would indicate entrance to self-employment was seen as an opportunity (Meager 1992; Bosma and Levie 2009; Kelley, Singer, and Herrington 2015).

Geographical location ( $GL_{ijt}$ ) is used to determine if the location of a country has continued to decrease in significance over time. The GEM regional data is used, and the following regions identified: (1) the Middle East and Africa, (2) Central and East Asia, (3) Latin America and the Caribbean, and (4) Europe and North America. Therefore, the

$GL$  variable will be broken out into three categories of dummy variables,  $d_{i1}$ ,  $d_{i2}$ , and  $d_{i3}$ , where the Middle East and Africa region is the base category,  $d_{i1}$  includes Central and East Asia,  $d_{i2}$  includes Latin America and the Caribbean, and  $d_{i3}$  includes Europe and North America. Bosma et. al. (2021) discusses that the COVID-19 pandemic highlighted that distance was no longer a barrier to doing business for entrepreneurs. This assertion is tested for the shock year of 2009.

### *Methods*

This essay will utilize data from the World Bank (2022), U.S. Bureau of Labor Statistics (2022b, 2022c), OECD (2022e), Medina and Schneider (2019), and the Global Entrepreneurship Monitor (2022) to analyze self-employment on a global scale. This analysis will include a time series regression to assess self-employment using GEM data from 2002 - 2018 and include 2009 as an indicator variable to assess self-employment after the 2007-2008 financial crisis. The countries in the GEM studies range from 10 to 60, depending on the year, and total 114 countries over the whole data set. This study includes 50 countries that meet the following criteria: have at least three years of data and include the shock year 2009. Appendix D includes a list of the 50 countries included in this study,

These assessments are used to determine if a shock to the economy affects self-employment and can provide a prediction for self-employment outcomes in relation to shocks. The following model includes independent variables across countries, signified by  $(i)$ , time, signified by  $(t)$ , and multiple panels within a variable, signified by  $(j)$ . The model,



$$\begin{aligned}
SE_{it} = & \beta_0 + \beta_1 Gen_{ijt} + \beta_2 Age_{ijt} + \beta_3 EA_{ijt} + \beta_4 WS_{it-1} + \beta_5 WS_{it} + \beta_6 Motive_{ijt} + \\
& \beta_7 I_{ijt} + \beta_8 MIMIC_{it} + \beta_9 Shock_t + \beta_{10} NEB_{it} + \beta_{11} GDP_{it} + \beta_{12} Unempl_{it} + \\
& \gamma_1 GL_{ijt} + \gamma_2 CS_{ijt} + \varepsilon
\end{aligned} \tag{3}$$

includes  $Gen_{ijt}$ , which is percent of the self-employed population that are male in a given year,  $Age_{ijt}$  is percent of the self-employed population in a specific age category in a given year,  $EA_{ijt}$  is the educational attainment in a given year,  $WS_{it}$ , is the current work status (wage employment),  $WS_{it-1}$  is the status of work in the previous year,  $Motive_{ijt}$  is whether people were pushed or pulled into self-employment in a given year,  $I_{ijt}$  is the income level in a given year,  $MIMIC_{it}$  is the rating score of the informal economy in a given year,  $Shocks_t$  indicates if a shock occurred in a given year,  $NEB_{it}$  is the number of established businesses in a given year,  $GL_{ijt}$  is the geographical location of a country and is broken out into dummy variables to represent three categories  $d_{i1}$ ,  $d_{i2}$ , and  $d_{i3}$ , and  $CS_{ijt}$  is the country status (more developed or less developed) in a given year and is broken out into dummy variables to represent two categories  $g_{i1}$  and  $g_{i2}$ . This model is used to formulate the following hypotheses:

$H_0$ : Country status will not significantly affect self-employment.

$H_1$ : Country status will significantly affect self-employment.

$H_0$ : A large informal economy will not affect self-employment.

$H_2$ : A large informal economy will negatively affect self-employment.

$H_0$ : Shocks to the economy will not affect self-employment.

$H_3$ : Shocks to the economy will positively affect self-employment.

$H_0$ : The geographical location of a country will affect self-employment.

$H_4$ : The geographical location of a country will not affect self-employment.

$H_0$ : Established business ownership has not increased over time.

$H_5$ : Established business ownership has increased over time.

### Analysis and Results

The regression models for the GEM data are tested for goodness of fit, normality, homoscedasticity, randomness, autoregressive qualities (i.e., is the model an AR(1) or AR(2). Next, they are tested to determine if there is a unit root, which would yield I(1), or if there is no unit root present, which would yield the model I(0). If there is a unit root, it is determined if it takes a random walk or has a drift. Then, the models are detrended with the addition of a year variable and include a quadratic of the year to determine if self-employment is increasing or decreasing over time. The model is also tested for fixed or random effects to determine if the first-difference should be used instead of the year variable to detrend the data.

The Kolmogorov-Smirnoff normality test yields a p-value too low to confirm normality of the data. The data has both skewness and kurtosis. The White's test concludes that the model is heteroscedastic and that there is no constant variance. This can be attributed to the years of data for each country not being consecutive years, nor does each country have the same number of years of data. The Wald-Wolfowitz Runs test was performed and concluded that the dependent variable is random, but not regarding the mean or median. This means that there is a negative serial correlation between yearly self-employment numbers. Therefore, self-employment numbers that are higher than the mean or median in one year are then followed by numbers that are lower and vice versa in the next (Naghshpour 2016).

The model follows an autoregressive model of order 2, AR(2), which means that nothing passed the second lag of self-employment, and the working status affects this model. This means that there is a short-term relationship between unemployment and self-employment and the current working status and self-employment. The Pairwise comparison shows that self-employment is not correlated with either the lag of self-employment (.8850) nor the lag of TEAWorking (.7384). This indicates that the model is I(0), which includes a weakly dependent process, and nothing needs to be done with the data (Wooldridge 2019). However, a time variable will need to be added to account for trending behavior in the variables and to detrend the data (Wooldridge 2019).

The model was also tested on whether the model has fixed effects or random effects. The fixed effects model controls for time-invariant differences between panels, so it cannot be biased because of omitted time-invariant characteristics (gender, race, culture, religion, etc.) (Torres-Reyna 2007). The model was concluded to be a fixed effects model as the p-value is 0.000, which is less than the 0.05 threshold. Additional information on the results of the fixed effects model is found in Appendix C.

Table 3.1 includes the descriptive statistics for all regression variables.

Table 3.1

Descriptive Statistics GEM data 2002 – 2018

Variable	Obs	Mean	St. Dev.	Min	Max
selfempl	570	11.542	9.257	.01	63.33
TEA	570	10.435	7	1.4	40.34
TEAMale	570	12.625	7.498	.76	41.57
MotiveOpp	570	7.202	4.878	.09	29.57
MotiveNec	570	2.876	2.707	.15	16.45
TEA1824	493	9.043	6.863	.35	41.35
TEA2534	494	13.526	7.964	1.46	44.6
TEA3544	494	12.386	7.555	1.38	42.8

Table 3.1 (continued)

TEA4554	494	9.969	6.727	1.04	43.43
TEA5564	494	6.409	5.312	.28	28.84
TEASecEd	487	8.238	6.929	.29	35.69
TEASecEdGrad	488	10.339	7.492	.59	48.97
TEAPostSecEd	474	12.327	7.968	.97	46.76
TEAGrad	391	13.226	8.469	.11	49.62
TEAWorking	490	13.559	8.551	2.47	45.74
TEALowIn	473	7.091	6.394	.27	35.81
TEAMidIn	484	8.556	7.045	.32	36.64
TEAHiIn	482	10.847	7.763	.45	37.17
NumEstBus	570	245.238	347.498	7.25	2937
Mimic	530	21.318	10.358	5.1	56.1
shock09	570	.088	.283	0	1
TEA09	570	.912	3.525	0	33.67
NumEstBus09	570	21.719	120.402	0	2059
time	570	9.391	4.601	1	17
time2	570	109.332	86.771	1	289
GDPPCG	570	1.747	3.539	-17.15	13.64
unempl	570	8.296	5.163	1.64	28.01

†Observation is the number of observations, which is also the number of years.

†Mean is the mean of the data over the number of years.

†Std. Dev. is the standard deviation of the data.

†Min and Max are the minimum and maximum values of the data.

Table 3.2 includes four regression models: (1) is the base model of the study, (2) includes a time variable to detrend the model, (3) includes a quadratic of time to assess changes over time, and (4) includes interaction variables of TEA with the shock year 09, GEM geographical categories, and GEM country status categories. The regression models' outputs indicate that the models are good with an  $R^2$  ranging from 90.1% to 91.3% and a constant joint f-statistic of 0.000.

Table 3.2

Panel regression models for 50 countries using GEM data

	(1) selfempl	(2) selfempl	(3) selfempl	(4) selfempl
L.selfempl	.613***	.599***	.601***	.574***

Table 3.2 (continued)

	(.038)	(.039)	(.039)	(.039)
GDPPCG	.078	.081	.087*	-.061
	(.05)	(.05)	(.052)	(.059)
TEA5564	.106	.116	.112	.21**
	(.097)	(.097)	(.097)	(.098)
TEASecEd	-.29***	-.28***	-.282***	-.332***
	(.084)	(.085)	(.085)	(.083)
TEAPostSecEd	.116*	.127*	.123*	.11
	(.07)	(.07)	(.071)	(.069)
L.TEAWorking	-.175***	-.173***	-.175***	-.179***
	(.047)	(.047)	(.047)	(.047)
TEAHiIn	.123*	.081	.082	.077
	(.069)	(.074)	(.074)	(.074)
NumEstBus	-.001*	-.001*	-.001*	-.001
	(0)	(0)	(0)	(0)
TEA09				-.245***
				(.073)
TEAd2				-.155**
				(.063)
TEAd3				-.201**
				(.081)
_cons	-1.313**	-2.319***	-3.117*	-1.721
	(.6)	(.881)	(1.871)	(1.908)
Observations	328	328	328	328
R-squared	.902	.903	.903	.913

Note: Additional variables in the model that are not significant: unempl, TEAMale, MotiveOpp, MotiveNec, age categories (TEA1824, TEA2534, and TEA4554), TEAWorking, income categories (TEALowIn and TEAMidIn), mimic score, time variable for detrending,  $time^2$  to assess trending over time, interaction variables (TEAd1, TEAg1, and TEAg2).

Note: Standard errors are in parentheses \*  $p < .1$ ; \*\*  $p < .05$ ; \*\*\*  $p < .01$

†Obs is the number of observations, which is also the number of years.

†Mean is the mean of the data over the number of years.

†Std. Dev. is the standard deviation of the data.

†Min and Max are the minimum and maximum values of the data.

The significant variables in model 1 include the *L.selfempl*, *TEASecEd*, *TEAPostSecEd*, *L.TEAWorking*, *TEAHiIn*, and *NumEstBus*. The lag of self-employment variable has a coefficient of .613 meaning that when people were self-employed in the previous year, they are 61.3% more likely to be employed in the current year. The

*TEASecEd* variable has a coefficient of -.29 meaning that people with only some secondary education are 29% less likely to enter self-employment. The *TEAPostSecEd* variable has a coefficient of .116, which means that when people have an undergraduate degree, they are 11.6% more likely to enter self-employment. This is consistent with Nikolova and Bargar's (2010) finding that women with an increase in education are less likely to enter self-employment, while men with an increase in education are more likely to enter self-employment.

The *L.TEAWorking* variable has a coefficient of -.175 indicating that when people are wage-employed in the previous year there is a decrease in entrance to self-employment by 17.5%. This negative relationship could indicate that people will remain in wage-employment for benefits security (Dornbusch, Fisher, and Starz 2008; Baker, Égert, Fulop, and Mourougane 2018; Zwan, Hessels, and Rietveld 2018; Bureau of Labor Statistics 2022a). However, it is speculated that this negative relationship could be a progression in the entrepreneurial process from nascent entrepreneur (self-employed) to established business owner (Meager 1992; Bosma et al. 202). The *TEAHiIn* variable has a coefficient of .123 indicating that when people have more income, they are 12.3% more likely to enter self-employment (Reynolds, Hay, and Camp 1999; Watson and Kaeding 2019; OECD 2022b). The *NumEstBus* variable has a coefficient of -.001 indicating that when the number of established businesses increases by one percent, self-employment will decrease by 0.1%. This decrease in self-employment, albeit small, could be due to outflows in the nascent entrepreneur portion of the cycle to established business owner (Schneider 1997; Cullen, Johnson, and Parboteeah 2014; Reynolds, Hay, and Camp 1999; Center for American Entrepreneurship 2022).

The significant variables in model 2 include the *L.selfempl*, *TEASecEd*, *TEAPostSecEd*, *L.TEAWorking*, and *NumEstBus*. Adding the time variable decreased the coefficient for the *L.selfempl* variable from .613 to .599, the *TEASecEd* variable from -.29 to -.28, and increased the *TEAPostSecEd* variable from .116 to .127, and the *L.TEAWorking* variable from -.175 to -.173. This indicates that, year-over-year, entrance into self-employment will increase 59.9% if those who are self-employed were self-employed the year before, will decrease 28% if they only have some secondary education, but will increase 12.7% if they have an undergraduate education. However, if they are wage-employed in the previous year, their chance of entering self-employment decreases by 17.3% year-over-year.

The *NumEstBus* variable has a coefficient of -.001 indicating that, albeit very small, the number of established businesses decreases by .1% year-over-year. This could be due to the decrease in age of those seeking self-employment. For example, Reynolds, Bygrave, and Autio (2003) discuss that the people who report an increase in established business ownership are those in the older age categories. Minniti, Bygrave, and Autio (2005) add that entrance into self-employment is more prevalent for people aged 25-34, but established business ownership is more prevalent for people aged 45-54. On the other hand, Bosma and Levie (2009) discuss that the ratio of TEA to established business owners decreases as economic development increases. This is reflective of the ratio between the reduction of new business owners to the discontinuance of EBO and is specifically noticeable in innovation-driven economies (Bosma and Levie 2009).

The significant variables in model 3 include the *L.selfempl*, *TEASecEd*, *TEAPostSecEd*, *L.TEAWorking*, and *NumEstBus*, which are the same significant variables

in model 2, and also includes *GDPPCG*. The inclusion of the time quadratic, which assesses self-employment in the long-term, only slightly changed the coefficients of the *L.selfempl* from .599 to .601 and the rest of the coefficients were the same. The *GDPPCG* variable has a coefficient of .087 indicating that when the GDP per capita growth increases by one percent, then self-employment will increase by 8.7% in the long-term. This positive relationship between GDP per capita growth and self-employment could be attributed to increases in the entrance to self-employment or progression through the entrepreneurial process to established business owners (Bosma et al. 2021).

The significant variables in model 4 include the *L.selfempl*, *TEASecEd*, *TEA5564*, *TEA09*, *TEAd2*, and *TEAd3*. This model includes interaction variables between TEA and the shock year of 2009, the geographical locations, and country status. The consistently significant variables include the *L.selfempl* variable, which decreased from .601 to .574, and the *TEASecEd* variable, which decreased from -.282 to -.332.

The additional variables that are significant in this model include the age category of 55-64 with a coefficient of .21, and the interaction variables *TEA09* with a coefficient of -.245, *TEAd2* with a coefficient of -.155, *TEAd3* with a coefficient of -.201. The *TEA5564* coefficient of .21 indicates that when the number of people in the age category of 55-64 increases, there is an increase in self-employment by 21%. This is consistent with the literature that older people are more likely to be self-employed and progress through the entrepreneurial process (Earle and Sakova 2000; Rissman 2003; Nikolova and Bargar 2010; Dvouletý and Lukeš 2016; Moulton and Scott 2016; Bosma et al. 2021; Global Entrepreneurship Research Association (GERA) 2023).



The interaction variable *TEA09* has a coefficient of  $-.245$  meaning that the total early-stage entrepreneurial activity in 2009 decreased self-employment by 24.5%. This is consistent with the 2009 GEM report, which saw an overall decrease in TEA (Bosma and Levie 2009). However, it is noted that a reduction in TEA for factor-driven economies is not always a bad thing. It could be an indicator of an excelling economic climate, like when job opportunities increase. A reduction in TEA could also be due to the decrease in the refugee-push into entrepreneurship (Bosma and Levie 2009). *TEAd2* has a coefficient of  $-.155$ , which means that as the total early-stage entrepreneurial activity in d2 (Latin America and the Caribbean) increases, the self-employment rate in Latin America and the Caribbean decreases by 15.5% over the other regions. This is consistent with Bosma and Levie (2009) that state that Latin American countries in the efficiency-driven category have a higher TEA rate than countries in Eastern Europe, or the d3 category.

*TEAd3* has a coefficient of  $-.201$  meaning that when the total early-stage entrepreneurial activity in d3 (Europe and North America) increases, the self-employment rate in Europe and North America decreases by 20.1% over the other regions. This shows an inverse, or negative relationship between the d3 region (Europe and North America) and the d1 (Central and East Asia) and d2 (Latin America and the Caribbean). This is consistent with the GEM reports that discuss TEA being lower in more affluent countries, like those in Europe and North America, than in countries that have a lower economic standing (Reynolds, Hay, and Camp 1999; Minniti, Bygrave, and Autio 2005; Bosma et. al. 2008; Kelley, Bosma, and Amorós 2010; GERA 2018).

## *Hypotheses*

Hypothesis 1 states that a country's status will significantly affect self-employment. The country status variable was proxied by dummy variables, *g1*, or the efficiency-driven category and *g2*, or the innovation-driven category. The study found that none of the country status variables are significant. However, when the variables are in a stand-alone model, they are both significant with coefficients of 7.06 and -9.03, respectively. This indicates that there is a positive relationship between countries in the *g1*, or efficiency-driven category, and self-employment, and a negative relationship between countries in the *g2*, or innovation-driven category, and self-employment. These findings are consistent with the literature that as countries progress in economic status, the entrance to self-employment decreases (GERA 2017; GERA 2018; Bosma et. al. 2021). Since there are mixed reviews and no significance in the model, we fail to reject the null and state that a country's status does not affect entrance to self-employment. However, this results in a type II error of failing to reject null when it is false (Naghshpour 2012).

For example, there are many variables that contribute to a country's economic standing as shown in figure 3.3 from the 2009 GEM report, which includes NES identified variables that are present in each economic category (Bosma and Levie 2009). This figure indicates that while there are basic requirements for countries to meet to progress towards entrepreneurship, the addition of higher education and training, government financial programs, efficient goods, labor, and financial markets, and a physical infrastructure for entrepreneurship leads to an increase in entrepreneurial success (Bosma and Levie 2009).

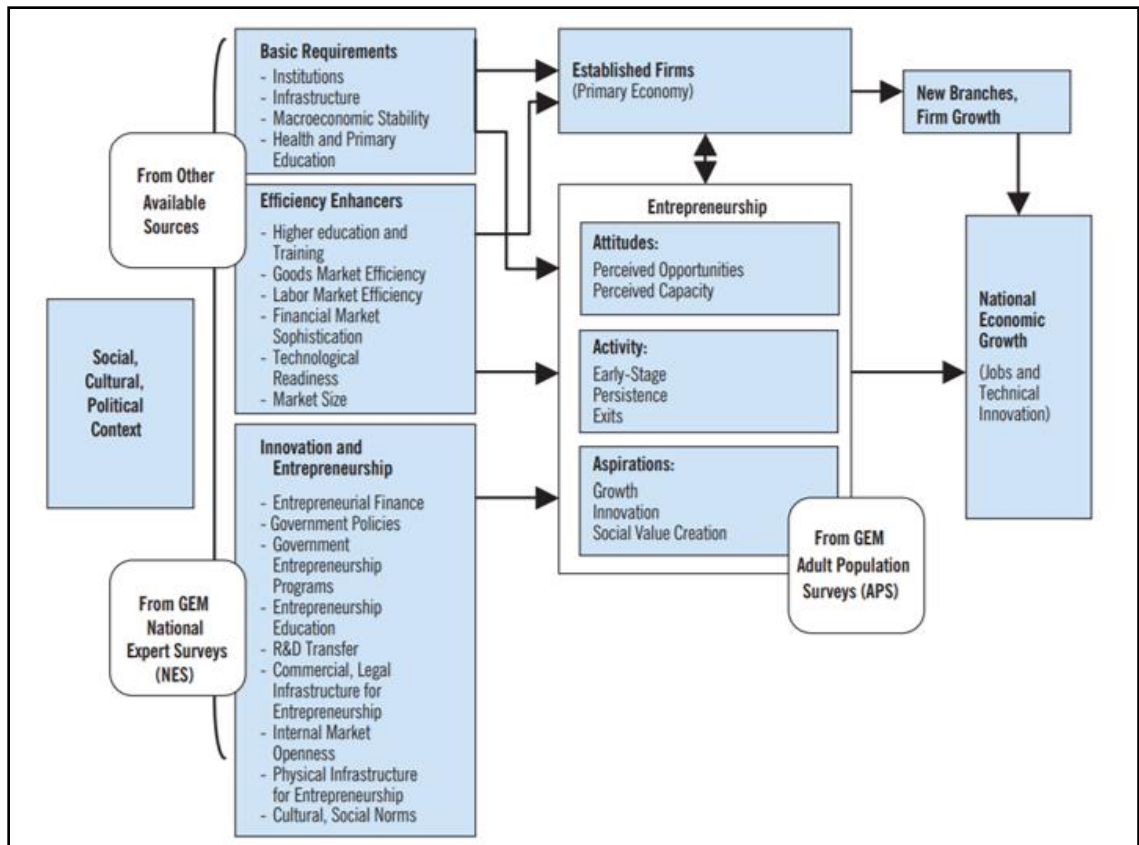


Figure 3.3. The GEM model of how entrepreneurship is affected by national conditions.

Source: Data from Bosma and Levie 2009, accessed March 15, 2023, <https://www.gemconsortium.org/file/open?fileId=47108>.

Hypothesis 2 states that a large informal economy will negatively affect self-employment. This would mean that there is an inverse relationship between the informal economy and self-employment. The *MIMIC* score, which is used as a proxy for the informal economy, was not significant in any of the studies. However, the coefficients for models one through four are -.001, -.0001, .0000, and -.0002, respectively, which indicates a negative relationship, albeit very small, with self-employment in three of the four models. This means that we reject the null and conclude that the informal economy will negatively affect self-employment. This slightly negative relationship could be due to 21 of the 50 countries in the study being in the innovation-driven, or high-income

category. These countries have a lower MIMIC score, indicating their informal economy is smaller than the efficiency-driven and factor-driven economies. Thus, the larger an informal economy, the more likely self-employment will decrease in those countries (Schneider 1997; Cullen, Johnson, and Parboteeah 2014). Including additional factor-driven countries could provide a clearer picture of the effects the informal economy has on self-employment.

Hypothesis 3 states that shocks to the economy will positively affect self-employment, meaning that during a time of economic shock, entrance to self-employment will increase. The shock year used in this study was 2009, which was the year after the 2007-2008 financial crisis. The 2009 year was interacted with the total early-stage entrepreneurial activity for each country in that year to determine if the year itself had an effect on entrance into self-employment. The *TEA09* variable was significant at the 99% confidence interval, therefore, we reject the null and say that a shock to the economy will positively affect self-employment.

On one hand, the 2009 GEM report states that the TEA in 2009 decreased on the whole. It also states that this decrease could be good for factor-driven economies as it could show positive economic activity like an increase in the job market, as well as could be due to a decrease in entrance into self-employment out of necessity (Bosma and Levie 2009; Kelley, Singer, and Herrington 2015; GERA 2018). However, in this study there are a high number of innovation-driven economies, which could have contributed to the positive relationship with self-employment. Therefore, the increase in entrance in wealthier countries, or people in innovation-driven economies, is attributed to the

opportunity to make money in the economic downturn rather than out of necessity (Meager 1992; Bosma and Levie 2009; Kelley, Singer, and Herrington 2015).

Hypothesis 4 states that the geographical location of a country will not affect self-employment. The geographical location variable was proxied by three dummy variables ( $d1$ ,  $d2$ , and  $d3$ ). The dummy variables were interacted with *TEA* to determine if TEA in each region had an effect on self-employment. The  $d2$  (Latin America and the Caribbean) and  $d3$  (Europe and North America) regions were both significant at the 99% confidence interval with coefficients of  $-.155$  and  $-.201$ , respectively. Therefore, we fail to reject the null and say that the geographical location of a country does have an effect on entrance into self-employment.

However, the specific location of a country is not the main factor that affects self-employment. Instead, it is more in line with the economic development factors of a country and, in turn, the region it is in (GERA 2017; Bosma et. al. 2021). For example, GERA (2017) reports that economies within the same geographical region and/or development level contribute to the diversity of entrepreneurial propensity. This is indicative of the factors specific to the entrepreneurial ecosystems within economies, which, in turn, contributes to entrepreneurial propensity (GERA 2017; Bosma et. al. 2021). Therefore, it is more likely that the geographical category countries are put in are because of the economic standing, rather than their specific location.

Hypothesis 5 states that established business ownership has increased over time. This hypothesis was used to determine if the decrease in self-employment is due to an increase in progression through the entrepreneur process. The EBO variable was proxied by the number of established businesses (*NumEstBus*). The variable *NumEstBus* was

significant in models one, two, and three at the 90% confidence level with a coefficient of -.001 in each. The coefficients of *NumEstBus*, *time*, and *time*<sup>2</sup> are included in the following equation,  $selfempl = \beta_0 + \beta_1 NumEstBus + \beta_2 time + \beta_3 time^2$ , to determine the accuracy of this outcome. This results in,  $selfempl = -3.12 - 0.001 + 0.278 - (0.008)^2 = -2.84$ . This should lead to a rejection of the null and say that there is a decrease in the number of businesses over time. However, the hypothesis states that there would be a positive relationship. This concludes that there is a type three error, where the null hypothesis is rejected, but for the wrong reason (Naghshpour 2012).

The decrease in the number of businesses could be attributed to an increase in wage employment, where people leave self-employment and return to wage employment. Typically, this is due to the security of benefits in the wage employment category (Dornbusch, Fisher, and Starz 2008; Baker, Égert, Fulop, and Mourougane 2018; Zwan, Hessels, and Rietveld 2018; Bureau of Labor Statistics 2022a). Additionally, the *L.TEAWorking* variables were significant with negative coefficients in all four models at the 99% confidence level (-.175, -.173, -.175, and -.179). This supports the conclusion that there is an inverse relationship between wage employment and self-employment (Hipple and Hammond 2016).

Another potential explanation for the decrease in established business owners is the development level of the country. For example, the 2015/2016 GEM report discusses that there are more people starting businesses in factor-driven (low income) economies. However, regarding TEA, there are fewer established business owners in the factor- and efficiency-driven economies (Kelley, Singer, and Herrington 2016). This means that while there are fewer people entering self-employment in developed countries, they are

more likely to make it to established business ownership. It is also found that fewer people in innovation-driven economies (high income) discontinue their business (Kelley, Singer, and Herrington 2016).

### Conclusion

This essay assessed the Global Entrepreneurship Monitor (GEM) data from 2002 through 2018 to analyze entrepreneurship on a global scale. The GEM data was collected through the Adult Population Survey (APS), which focuses on individuals as panels of observation and collects information on entrepreneurial motivations, aspirations, and characteristics (GEM 2022c). This survey is administered to at least 2,000 individuals in each participating country to collect information on the entrepreneurial activity, attitudes, and aspirations of the respondents (GEM 2022c). The GEM identifies that people who enter the entrepreneurial process as self-employed are typically older males who have an educational level of at least a high school diploma, access to business start-up funds, live in less developed (developing) countries, and start a business out of necessity (Bosma et. al. 2008; Kelley, Bosma, and Amorós 2010; Xavier et. al. 2012). However, this study found that individuals are more likely to enter self-employment if they are in the 55-64 age category, have an undergraduate education, and were self-employed in the previous year. Additionally, the country status and shock year of 2009 also play a role in determining entrance into self-employment.

The GEM identifies that those in the 25-34 age range are more likely to enter self-employment and start a business, however, those closer to retirement age, typically between 45 and 64, are more likely to maintain business status (GERA 2018; Bosma and Kelley 2019; Bosma et. al. 2020; Kelley et. al. 2022). This is due to a more established

financial backing, and higher educational attainment, which leads to the 55-64 age category being more likely to maintain established business status (GERA 2018; Bosma and Kelley 2019; Bosma et. al. 2020; Kelley et. al. 2022). The increase in younger people entering self-employment is due to a higher level of entrance in factor-driven and efficiency-driven economies (Bosma and Levie 2009; Kelley, Singer, and Herrington 2015; GERA 2018). However, in this study, there were 21 out of 50 countries that were in the innovation-driven category, which could have skewed the findings.

The educational attainment variable typically has an inverse relationship with self-employment, meaning that the more educated people are, the less likely they are to enter self-employment (Earle and Sakova 2000; Nikolova and Bargar 2010; Borjas 2013; Dvouletý and Lukeš 2016; Hipple and Hammond 2016). For example, the GEM discusses that people with at least a high school diploma are more likely to enter self-employment (Bosma et. al. 2008; Kelley, Bosma, and Amorós 2010; Xavier et. al. 2012). This also parallels those individuals living in factor-driven (lower income) countries where there is a decrease in other options for employment (Bosma and Levie 2009; Kelley, Singer, and Herrington 2015; GERA 2018). However, this study found that people with at least an undergraduate degree were more likely to enter self-employment. This could be due to a large portion of the countries in this study being from the innovation-driven category.

For example, while this study found both the secondary education and post-secondary education categories to be significant, the secondary education category had the expected negative coefficient in each model while the post-secondary education had a positive coefficient in models one through three. For example, the *TEASecEd* variable has



a coefficient of -.29 meaning that people with only some secondary education are 29% less likely to enter self-employment. On the other hand, the *TEAPostSecEd* variable has a coefficient of .116, which means that when people have an undergraduate degree, they are 11.6% more likely to enter self-employment. This is consistent with the findings that men are more likely to enter self-employment than women. Additionally, as women's education increases their entrance to self-employment decreases, while men with an increase in education are more likely to enter self-employment (Nikolova and Bargar's 2010).

The physical location of a country does not specifically contribute to the entrance into self-employment. However, the geographical location of a country contributes to people's entrepreneurial propensity. This is due to the factors specific to the entrepreneurial ecosystems within economies that reside in the same geographical region and/or development level (GERA 2017; Bosma et. al. 2021). Therefore, the development level of an economy plays a role in the entrance (TEA) and continuance (progression to established business owner) rates of businesses (GERA 2018). In these countries, entrance into self-employment is necessity driven due to their economic standing. For example, Zambia (41%), Ghana (37%), Nigeria (35%), and Angola (32%) have the highest TEA rates in the world (Herrington and Kelley 2012). This is consistent with the geographical region that consists of countries in the Middle East and Africa, which includes factor-driven economies that are dominated by subsistence agriculture and extraction businesses, which heavily relies on unskilled labor and natural resources (GERA 2018). This study only had 5 countries in the factor-driven category, which could be the reason for the *TEAg1* and *TEAg2* variables not being significant in this study.

The economic status of a country consists of multiple variables that determine economic success (GERA 2017). For example, the 2009 GEM report discusses that there are basic requirements for countries to meet to progress towards entrepreneurship, including the establishment of institutions, infrastructure, macroeconomic stability, health and wellness, and education (Bosma and Levie 2009). However, in order for a country to move beyond the basic foundation, efficiency enhancers are applied including the addition of higher education and training, government financial programs, and efficient goods, labor, and financial markets. Additionally, to reach innovation and entrepreneurial status, a physical infrastructure for entrepreneurship, enhanced research and development, and set cultural and social norms are achieved (Bosma and Levie 2009).

It is determined that the shock year of 2009 did have an effect on countries globally, and the 2009 GEM report agrees that self-employment was affected by the financial shock of 2007-2008 (Bosma and Levie 2009; GERA 2017). The financial crisis of 2007-2008 resulted in an economic downturn until about 2012 (GERA 2017). This crisis led to a decrease in dependence on large corporations, which also prompted entrepreneurship as a primary driver in sustainable economic growth (GERA 2017). For example, the United States began to recover from the 2007-2008 crisis in 2011 showing an increase in entrance to self-employment and a lagged increase in established business ownership. Therefore, the United States has had the strongest recovery from the financial crisis of all OECD countries (Bosma and Kelley 2019). On the other hand, Italy is still struggling to recover from the financial crisis with the lowest TEA of all innovation-driven economies (Bosma and Kelley 2019; Bosma et. al. 2020). This is cited because of political polls in 2018 and the difficulties forming a coalition government, which is

supported by the decrease in propensity-pull into self-employment (Bosma and Kelley 2019). The high rate of unemployment should cause an increase in necessity entrepreneurship. However, the increase in unemployment benefits has slowed the entrance to self-employment altogether and the Five Star movement proposal by the populist party is expected to exacerbate the situation (Bosma and Kelley 2019).

The limitations identified in this study include limited access to current data, a decreased data set due to the study's restrictions, and further analysis of the TEA and EBO relationship. First, the GEM only releases data every three years. The latest data available at the time of this study was 2018, while the reports on the data are current through 2023. Second, this study focused on the shock year of 2009 to validate its effect globally. In doing so, only countries that had 3 or more years of data and those that included the shock year 2009 were included in this study. That decreased the size of the study from 114 countries to 50. This unintentionally decreased the factor-driven pool of countries, which could have also affected the outcomes of the other independent variables.

Last, further comparisons between TEA and EBO could provide a clearer picture on the outflow from self-employment and the inflow to establish business ownership (Meager 1992; Schneider 1997; Cullen, Johnson, and Parboteeah 2014; Reynolds, Hay, and Camp 1999; Center for American Entrepreneurship 2022). It is noted throughout the GEM reports that younger people enter self-employment, but older people maintain established business ownership (Bosma and Levie 2009). Therefore, further review of the factors that cause younger people to leave self-employment, contributing to a greater

outflow, could help in creating policies or programs to help young people progress to established business ownership.

## CHAPTER V – CONCLUSION

This dissertation included three essay studies that identified the economic and social determinants that affect people's decision to enter self-employment. Chapter two included the United States as a country-level foundation study, Chapter three included a comparative analysis between the United States and the United Kingdom as it relates to a structural change in self-employment after a shock, and Chapter four included a global view of GEM data.

### Chapter two: Determinants of self-employment in the United States

Chapter two provided a base-level assessment, utilizing time series data, to determine the factors that affect self-employment in the United States. Previous literature identifies the typical self-employed as white males close to retirement age with access to income (Meager 1992; Noorderhaven et al. 1999; Rissman 2003; Hipple 2004; Dvouletý and Lukeš. 2016; Moulton and Scott 2016; Baker, Égert, Fulop, and Mourougane 2018). This study found that people who enter self-employment are still older, include races other than white, don't require individual income to succeed, are increasingly female, rely on other means of income (i.e., SBA allocations), have an inverse relationship with the private sector of employment, are motivated by the opportunity self-employment provides, and are minimally deterred by tax and interest rates.

Private sector employment has a consistently significant negative effect on self-employment across all 5 models (-0.453, -0.473, -0.422, -0.368, and -0.636). This means that when private sector employment decreases, self-employment will increase and vice versa. This finding is consistent with the literature, specifically in more recent years after the economic shock of the COVID-19 pandemic. A time known as the Great Resignation

saw a decrease of 4 million private sector workers a month from August 2021 to March 2022 (Bureau of Labor Statistics 2023b). Additionally, this finding is consistent with data from other time periods after an identified shock to the economy. For example, in each shock year (75, 82, 09, and 20) private sector employment decreased in the shock year and then increased in the year(s) after. Moreover, in all four shock years, self-employment rates increased during the shock year and then subsequently decreased after. This is consistent with the inverse relationship and provides evidence that economic shocks play a role in decisions to enter self-employment.

It was identified that when people are self-employed in the previous year, they are more likely to continue to be self-employed. For example, the lag of self-employment variable has a coefficient of 0.484, indicating that when the previous year's self-employment rate increases by one percent, the current year increases by 48.4%. This increase from one year to the next could be a sign of progression through the entrepreneurial cycle (Meager 1992; Bosma et al. 2021). It could also mean that the inflow to self-employment outweighed the outflow from self-employment (Meager 1992; Benedict and Hakobyan 2008; Borjas 2013). Additionally, the GEM discusses that as entrepreneurial aspirations increase, inflows will increase (Hart et al. 2020; Kelley et al. 2021; OECD 2022c). However, providing policy implementation beyond the start-up phase could increase participation towards entrepreneurship, potentially accounting for a decrease in outflows from self-employment (Meager 1992; Watson and Kaeding 2019; Freedström, Peltonen, and Wincent 2021).

The motivating factor to enter self-employment is represented by the unemployment variable, which had a consistent negative, inverse, relationship with self-

employment in all five models (-0.081, -0.101, -0.036, and -0.181). This negative relationship is consistent with the propensity-pull hypothesis that entrance into self-employment is due to the opportunity to make more money (Meager 1992; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012). This is also consistent with economies that are developed and innovation-driven, like the United States (GERA 2018).

Those aged 25 to 34 and 45 to 54 have the greatest significant impact on entrance into self-employment, albeit a negative one. While the 45-54 category is closer to retirement age, the 25-34 category is not. Over time, the 55-64 age category has the greatest positive effect on self-employment, however, that variable is not significant in any of the models. In the US is it more likely for older people to be self-employed as that age category includes more people due to the baby boomer era (Evans and Leighton 1989; Nikolova and Bargar 2010). This could also be due to people seeking self-employment as a second (or multiple) job (Becker 1984; Scott, Edwards, and Stanczyk 2020). However, more recent GEM data shows that 36 of the 47 economies included in the 2021-2022 study had a higher rate of entrance into self-employment from the 18-34-year-old category over the 35-64 category (Hill et al. 2022).

Factors that no longer affect self-employment include race and income. The race demographic of the United States is constantly changing with more black and Hispanic people entering the self-employment workforce (Kelley et. al. 2022). This explains the white variable not being significant in this study. For example, previous literature found that white and Asian males were the most likely to be self-employed, with Hispanic males coming in lower than both groups, and black males coming in lower than half that

of white males. In fact, white males were found to be three times more likely to be self-employed than black males (Borjas and Bronars 1989). Fairlie (2005) utilized the 1979 National Longitudinal Survey of Youth (NLSY79) data to confirm these statistics, reporting that whites have the highest entrance into self-employment with Hispanics in second and blacks with the lowest rate; at least through the early 2000s.

However, Kelley et. al. (2022) reports that as of 2021 there is a significant rise in black self-employed. Additionally, black individuals have a higher intention rate to start a business, a lower fear of failure progressing through the entrepreneurial process, are more motivated and feel more capable of starting a business, and have the highest established business ownership rates among black, white, and Hispanic business owners (Kelley et. al. 2022). This is also indicative of the increase in immigration rates in the US. For example, Hipple and Hammond (2016) state that, among the unincorporated, foreign-born people are more likely to enter self-employment than their native -born counterparts.

It was found that the income variable was not significant in any of the models but was consistently positive for the upper 20th percentile level of income (0.077, 0.074, 0.282, and 0.28). This is consistent with the literature that having more resources does increase the chances of people entering self-employment (Noorderhaven et al. 1999; Rissman 2003; Fairlie 2005; Nikolova and Bargar 2010; Dvouletý and Lukeš 2016). However, the negative relationship between self-employment and income in the first two models of the lowest 20 percentile income level and models 3 and 4 in the middle-income level could be due to increases in environmental shocks.

For example, funds allocated to business start-ups are typically from savings and current income. Therefore, when stock markets crash, like during the 2007-2008 financial



crisis, investments into new business ventures declined (Bosma and Levie 2009). This decrease in potential investments prompts the need for additional funding. Thus, in models 1 through 4, which include both income and SBA, there is a positive relationship between SBA and self-employment (0.003, 0.001, 0.052, and 4.56). The decline in usage of individual income during times of crisis increases the need for additional funding, therefore justifying the need for small business allocations (Dilger, Blackford, and Cilluffo 2022).

### Chapter three: Do shocks affect self-employment?

Chapter three utilized the method of ordinary least squares (OLS) estimates and a comparative analysis between the United States and United Kingdom to assess the factors that affect self-employment after an economic shock. This analysis furthered Nigel Meager's (1992) article, *Does Unemployment Lead to Self-Employment*, which analyzed the inflow to and outflows from self-employment to determine whether the relationship between self-employment and unemployment is pro- or counter-cyclical. The analysis included individual assessments of the United Kingdom and the United States, and a combined panel model. A comparative analysis between the United States and the United Kingdom was provided to assist the assessment of factors that affect self-employment, specifically during times of economic crisis.

The United Kingdom study found that there was a structural change in the motivation to enter self-employment in the United Kingdom. When the shock years (1981, 1993, 2009, and 2020) are interacted with unemployment, opposite coefficient signs are present, indicating a change from a refugee-push, or entrance out of necessity, into self-employment in 1981 and 2009 to a propensity-pull, or as an opportunity to make

more money, into self-employment in 1993 and 2020. This is indicative of the policy implementations in the UK, which during a time of economic crisis, appear to be proactive and all inclusive, providing funding opportunities at all ages and employment levels. For example, in the early 1980s, to combat the rise in unemployment in the UK, incentive programs like the Enterprise Allowance Scheme provided funds to people to start a business rather than be unemployed (Meager 1992; Office of National Statistics 2014). This caused the fastest growth in self-employment in the European Community countries from 1979 to 1988 (Meager, Kaiser, and Dietrich 1992).

However, in the early 1990s entrance to self-employment was seen as an opportunity. For example, the Sterling crisis, which included Sterling being overvalued against other currencies, caused hesitation to increase interest rates to counter the fall of Sterling, but did cause an increase in unemployment (Eichengreen and Hsieh 1995). This prompted a recession in the early 1990s and, in turn, a rise in unemployment and decrease in economic productivity. This resulted in a decrease in wage employment, thereby providing an opportunity for an increase in self-employment (Meager, Kaiser, and Dietrich 1992; Office for National Statistics 2014).

The financial crisis in 2007-08, which caused the deepest recession since World War II and included high rates of unemployment, debt, and many home repossessions, flipped the structure again to a refugee-push (Allen 2010; UK Commission for Employment and Skills 2014). This resulted in an overall decrease in output, which caused the GDP to consistently fall from mid-2008 to late 2009 (Allen 2010). The self-employment rates increased during this time, which was a result of the refugee-push effect as people were looking for an option other than unemployment (UK Commission

for Employment and Skills 2014; Giupponi and Xu 2020). In response, the UK government implemented policies including the New Enterprise Allowance Scheme, Local Enterprise Partnerships, Regional Growth Funds, and Coaching for Growth initiative (Hart and Levie 2010). These programs were intended to facilitate growth and assist the economy to continue the enterprise culture (Hart and Levie 2010; Hart, Levie, Bonner, and Drews 2014).

Last, the global COVID-19 pandemic, which included many business closures, loss of jobs, and spikes in unemployment, saw a structural change again to a propensity-pull (Bosma et. al. 2021; Hill et. al. 2022). For one, the unemployment rate was steadier, only increasing from 3.74% in 2019 to 4.9% in October 2020 and then averaging 4.47% at the end of the year (Office for National Statistics 2020). This is indicative of business and employee specific programs implemented by the UK government to support the economy (KPMG 2020; House of Commons 2023). These programs included the Self-Employment Income Support Scheme (SEISS), the Job Retention Scheme (JRS), the Kickstart program, National Insurance contributions and minimum automatic enrollment pension contributions, the Apprentice Scheme, the Trainee Scheme, and the Statutory Sick Pay (SSP) for small and medium sized businesses (KPMG 2020; House of Commons 2023). This time around, rather than seeing a positive relationship between unemployment and self-employment, the government implemented programs that caused a rise in self-employment countered the unemployment rate.

On the other hand, the United States study did not present a structural change from shock year to shock year. Instead, all coefficients were positive, indicating a refugee-push into self-employment. Literature states that during times of economic

hardship unemployment increases, which is typically followed by a counter-cyclical relationship with self-employment (Bögenhold and Staber 1991; Meager 1992).

However, over time, the counter-cyclical relationship fades and transitions to a positive relationship (Bögenhold and Staber (1991). This study verifies the latter with positive coefficients in all four shock years (1975, 1982, 2009, and 2020).

For example, the 1975 shock year could be due to President Nixon ending the gold standard in 1971, the Organization of the Petroleum Exporting Countries (OPEC) embargo in 1973 followed by an increase in inflation in 1974, and economic contraction in 1975 (Amadeo 2021). Unemployment increased during this time, causing an increase in self-employment (Bögenhold and Staber 1991; Meager 1992). Another example is the shock year of 1982, which was indicative of the recession from July of 1981 through November 1982, which was a result of the implementation of monetary policy to decrease inflation (Sablik 2013). This policy included increasing interest rates, which also caused an increase in unemployment, subsequently causing an increase in self-employment (Meager 1992; Bryant, Hooper, and Mann 1993; Taylor 1993; Noorderhaven et. al. 1999; Benedict and Hakobyan 2008; Garba 2012; Dvouletý and Lukeš 2016; Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019; Reynolds, Hay, and Camp 1999).

While entrepreneurial aspirations in the US were high during each shock year, where those seeking to start a business saw the opportunity being a business owner can bring, the lack of funding to begin the self-employment process causes hesitance and uncertainty (Schneider 1997; Schneider, Buehn, and Montenegro 2010; Omri 2020). Instead, there are programs implemented on the back end of economic crises to support

Americans after job loss or disturbance. For example, even though there were programs in place to assist in business funding, it was more difficult to start and/or maintain a business during the pandemic due to the increased difficulty in procuring funds from long wait times (Hart et al. 2020; Kelley et al. 2021). Therefore, entrance to self-employment was put off until there was no other option, or only sought out as a second income to supplement the first (Scott, Edwards, and Stanczyk 2020).

For example, the 2009 shock year is due to the 2007-08 financial crisis, which resulted in an increase in unemployment, a decrease in GDP, interest rates hitting their floor, and a decrease in initial public offerings of venture-backed companies (Ali et al. 2009; Weinberg 2013). This caused a decrease in maintaining businesses (EBO), even though nascent entrepreneurs saw the economic downturn as an opportunity to make money. This also led to government program implementations both for individuals with Fannie and Freddie Mac, which was taken over by the U.S. government to provide assistance in the housing market, and corporations, which included the Dodd-Frank Wall Street Reform and Consumer Protection Act that was implemented to improve accountability and transparency in the financial system, protect the American taxpayer by ending bailouts, and protect consumers from abusive financial services practices (Goodwin 2010; Weinberg 2013).

In 2020, the world experienced the global COVID-19 pandemic causing many business closures, loss of jobs, and spikes in unemployment (Bosma et. al. 2021; Hill et. al. 2022). The United States had a dramatic spike in unemployment to 14.7% in the second quarter and back down to 6.7% by the end of the year (Smith, Edwards, and Duong 2021). This resulted in half of entrepreneurs in the US entering self-employment

out of necessity, which was up from 22% in 2019 (Hart et al. 2020; Kelley et al. 2021). In response to the pandemic, the Fed immediately cut the federal funds rate by 1.5% to nearly zero and kept that rate as low as possible until the economy recovered (Kelley et al. 2021). Additionally, a lot of storefront locations of businesses closed their doors, and people at home with no income due to the federal government implementing a stay-at-home order beginning in mid-March (Kelley et al. 2021; Smith, Edwards, and Duong 2020; Kelley et al. 2021).

However, in light of many Americans losing their jobs when businesses closed, the need for benefits in the unemployment sector and the savings rate increased (Kelley et al. 2021). In response, the Paycheck Protection Program (PPP) Liquidity Facility and the Main Street Lending Program were implemented by the Fed to provide payroll support to small and medium sized businesses, at a low interest rate, to keep their employees on payroll (Kelley et al. 2021). Another funding program was the Coronavirus Aid, Relief, and Economic Security (CARES) Act, implemented to supply one-time cash payments to Americans (Kelley et al. 2021).

The combined panel model proved that there was not a significant difference between the US and UK, which was confirmed in the OLS model and by the Hausman test. The model was concluded to be a random effects model, which means that the variation across the US and UK are uncorrelated and random regarding the independent variables (Torres-Reyna 2007). Additionally, this means that the difference between the US and UK has an influence on entrance to self-employment, but this difference is not correlated with the independent variables (Torres-Reyna 2007). The significant variables in the combined model were the lag of self-employment and the political party in office.

The comparative analysis between the US and UK shows that the two countries have distinct differences regarding entrance to self-employment, and the implementation of government policies was a driving force. For example, the US has a rigid unemployment rate in times of economic crisis, where the UK has a smoother transition as it increases and decreases. Another example is the extent to how policies are implemented during times of economic crisis. While the extent itself is not measured in this study, it could be captured in the distribution of support, specifically funds, regarding how the funds are distributed and to whom.

#### Chapter four: Global Entrepreneurship Monitor (GEM) data

Chapter four utilized the method of ordinary least squares (OLS) estimates to assess the Global Entrepreneurship Monitor (GEM) data from 2002 through 2018 to analyze entrepreneurship on a global scale. The GEM data is collected through the Adult Population Survey (APS), which focuses on individuals as panels of observation that collect information on entrepreneurial motivations, aspirations, and characteristics (GEM 2022c). This study found that, on a global scale, people are more likely to enter self-employment if they are in the 45-54 age category, have an undergraduate education, and were self-employed in the previous year. Additionally, the country's geographical location, country's status (more developed or less developed), and the shock year of 2009 also play a role in determining entrance into self-employment.

The 45-54 age range being the most likely in this study does not align with the literature when all countries in the GEM reports are included. Instead, the age range that is the most up and coming for entrance into self-employment is the 35-44 age range (Minniti, Bygrave, and Autio 2005; Bosma et. al. 2008; Kelley, Bosma, and Amorós

2010; Xavier et. al. 2012; GERA 2018). However, this study did not include all 114 countries that are included in the GEM reports, instead this study included only those countries that included the shock year of 2009. This resulted in 50 countries included in the study, and 21 of those being from the innovation-driven (high income) countries and 24 from the efficiency-driven (middle income) countries. This is important because there is an increase in younger people in developing (factor-driven) countries, which could contribute to the increase in the self-employed at a younger age (Kelley, Singer, and Herrington 2016). For example, the 2007 GEM report identifies the group with the most prevalence, or that which is most common, in entering the entrepreneurial process is the 25-34 age group (GERA 2018; Bosma and Kelley 2019; Bosma et. al. 2020; Kelley et. al. 2022).

The educational attainment variable typically has an inverse relationship with self-employment, meaning that the more educated people are, the less likely they are to enter self-employment (Earle and Sakova 2000; Nikolova and Bargar 2010; Borjas 2013; Dvouletý and Lukeš 2016; Hipple and Hammond 2016). For example, the GEM discusses that people with at least a high school diploma are more likely to enter self-employment (Bosma et. al. 2008; Kelley, Bosma, and Amorós 2010; Xavier et. al. 2012). This also parallels those individuals living in factor-driven (lower income) countries where there is a decrease in other options for employment (Bosma and Levie 2009; Kelley, Singer, and Herrington 2015; GERA 2018). However, this study found that people with at least an undergraduate degree were more likely to enter self-employment. This could be due to a large portion of the countries in this study being from the innovation-driven category.



The geographical location of a country does not specifically contribute to the entrance into self-employment. However, it does contribute to people's entrepreneurial propensity. This is due to the factors specific to the entrepreneurial ecosystems within economies that reside in the same geographical region and/or development level (GERA 2017; Bosma et. al. 2021). Therefore, the development level of an economy plays a role in the entrance (TEA) and continuance (progression to established business owner) rates of businesses (GERA 2018). In these countries, entrance into self-employment is necessity driven due to their economic standing. For example, Zambia (41%), Ghana (37%), Nigeria (35%), and Angola (32%) have the highest TEA rates in the world (Herrington and Kelley 2012). This is consistent with the geographical region that consists of countries in the Middle East and Africa, which includes factor-driven economies that are dominated by subsistence agriculture and extraction businesses, which heavily relies on unskilled labor and natural resources (GERA 2018). This study only had 5 countries in the factor-driven category, which could be the reason for the TEAg1 and TEAg2 variables not being significant.

The economic status of a country consists of multiple variables that determine economic success (GERA 2017). For example, the 2009 GEM report discusses that there are basic requirements for countries to meet to progress towards entrepreneurship, including the establishment of institutions, infrastructure, macroeconomic stability, health and wellness, and education (Bosma and Levie 2009). However, in order for a country to move beyond the basic foundation, efficiency enhancers are applied including the addition of higher education and training, government financial programs, and efficient goods, labor, and financial markets. Additionally, to reach innovation and entrepreneurial

status, a physical infrastructure for entrepreneurship, enhanced research and development, and set cultural and social norms are achieved (Bosma and Levie 2009).

The shock year of 2009 did have an effect on countries globally, and the 2009 GEM report agrees that self-employment was affected by the financial shock of 2007-2008, which resulted in an economic downturn until about 2012 (Bosma and Levie 2009; GERA 2017). This crisis led to a decrease in dependence on large corporations, which also prompted entrepreneurship as a primary driver in sustainable economic growth (GERA 2017). For example, the United States began to recover from the 2007-2008 crisis in 2011 showing an increase in entrance to self-employment and a lagged increase in established business ownership. Therefore, the United States has had the strongest recovery from the financial crisis of all OECD countries (Bosma and Kelley 2019).

On the other hand, Italy is still struggling to recover from the financial crisis with the lowest TEA of all innovation-driven economies (Bosma and Kelley 2019; Bosma et. al. 2020). This is cited because of political polls in 2018 and the difficulties forming a coalition government, which is supported by the decrease in propensity-pull into self-employment (Bosma and Kelley 2019). The high rate of unemployment should cause an increase in necessity entrepreneurship. However, the increase in unemployment benefits has slowed the entrance to self-employment altogether and the Five Star movement proposal by the populist party is expected to exacerbate the situation (Bosma and Kelley 2019).

#### Future research

It is noted that there are limitations to each of these studies due to the lack of consistent and/or longevity of data. For example, Chapter two omits educational

attainment and immigration and is an aggregate study, rather than on an individual level. Chapter three omits the self-employment tax rate and government allocation for small and medium sized enterprises (SMEs) in the UK, inflows to and outflows from self-employment, and income data and how it can affect inflows and outflows. Chapter four encountered limited access to current data, a decreased data set due to the study's restrictions, and omitted the analysis of the TEA and EBO relationship. The inclusion of these variables could change the current studies' perspective of the typical self-employed.

For example, the profile of the self-employed, based on these three studies, includes males of varying races and income with post-secondary education between the ages of 25 and 64 that have an opportunistic entrepreneurial aspiration to enter self-employment, but find that entrance is more of a necessity. This is a shift from the literature that describes the typical self-employed to be older white males with a high school diploma and access to income (Meager 1992; Noorderhaven et al. 1999; Rissman 2003; Hipple 2004; Dvouletý and Lukeš. 2016; Moulton and Scott 2016; Baker, Égert, Fulop, and Mourougane 2018).

However, if immigration were included in the foundational US study, it would assist in solidifying that race is less of a factor when describing the identity of the self-employed (Earle and Sakova 2000; Nikolova and Bargar 2010; Borjas 2013; Dvouletý and Lukeš 2016; Hipple and Hammond 2016). For example, specifically in the unincorporated category of self-employment, foreign-born workers were more likely than U.S. native-born workers to be self-employed in 2015 (Hipple and Hammond 2016). Additionally, it is noted that the self-employed exist at all levels of educational attainment (Hipple and Hammond 2016). However, there is a difference between males

and females. For example, for men, the higher their educational background, the more likely they are to be self-employed. On the other hand, for women, the higher their educational background, the less likely they are to enter self-employment, even though they are more likely to maintain businesses through to established business ownership (Hill et. al. 2023). Last, dividing the US by region, state, or on an individual level could cause different results. For example, if a specific region or state were studied on an individual level, a probit analysis between male and female, or age categories could have been assessed. This level of analysis could provide a micro-level view of self-employment needs from an individual perspective.

In the comparative analysis between the US and UK, including the self-employment tax rate and government allocation for small and medium sized enterprises (SMEs) could provide a more robust perspective of how policy implementation plays a role in the motivation to self-employment (Hibbs 1977; Akard 1992; Reynolds, Hay, and Camp 1999; Hipple 2004; Baker, Égert, Fulop, and Mourougane 2018; Watson and Kaeding 2019). Additionally, including specific data on inflows to and outflows from self-employment, as well as income data and how it can affect inflows and outflows can provide a narrower view of if the outflow from self-employment is due to business closure or progression to entrepreneurship (Meager 1992; Taylor 2001).

In the GEM study, utilizing a longer data set, upon release of data from GEM, can assist in further assessments of effects from economic shocks, specifically regarding the COVID-19 pandemic. Additionally, including all 114 countries in the GEM data set or expanding the criteria to include all countries with 3 or more years of data and not focusing on the shock year of 2009, could provide a clearer picture of the effects

variables like the informal economy and country status has on self-employment.

Decreasing the size of the study from 114 countries to 50 unintentionally decreased the factor-driven pool of countries, which could have also affected the outcomes of the other independent variables. Last, further comparisons between TEA and EBO could provide a clearer picture on the outflow from self-employment and the inflow to establish business ownership (Meager 1992; Schneider 1997; Cullen, Johnson, and Parboteeah 2014; Reynolds, Hay, and Camp 1999; Center for American Entrepreneurship 2022). It is noted throughout the GEM reports that younger people enter self-employment, but older people maintain established business ownership (Bosma and Levie 2009). Therefore, further review of the factors that cause younger people to leave self-employment, contributing to a greater outflow, could help in creating policies or programs to help young people progress to established business ownership.

## APPENDIX A – Variables and Sources

Appendix A identifies the sources for the data that is used in each essay, chapters 2, 3, and 4. While some data are used consistently, the table is broken into each chapter and respective essay to keep all data together.

Table A1.

Variables and sources for all three studies

Variable	Variable Name	Source	How variable was calculated
<b>Chapter 2: Essay 1</b>			
Self-employment	<i>selfempl</i>	OECD (2022d)	Rate (%): number self-empl / total employed population (18-64)
Unemployment	<i>unempl</i>	OECD (2022c)	Rate (%): number unemployed / total working age population (18-64)
Race	<i>white</i>	U.S. Facts (2022)	Rate (%): number of whites working / total working population (18-64)
Gender	<i>Male</i>	U.S. Bureau of Labor Statistics (2022c)	Rate (%): number males working / total working population (18-64)
Age	<i>Age1619, Age2024, Age2534, Age3544, Age4554, Age5564</i>	World Bank (2022)	Rate (%): number of people working in respective age category / total working population (18-64)
Small Business Administration	<i>SBA</i>	U.S. Government Publishing Office (2022)	\$ amount: total \$ distributed in yearly US government budget
Shocks	<i>shocks</i> <i>y75, y81, y82, y93, y09, and y20</i>	OECD (2022c) World Bank (2022)	Dummy: 1 is there is one SD increase in unemployment and decrease in

Table A1 (continued)

			GDPPCG and 0 otherwise.
<b>Chapter 3: Essay 2</b>			
Tax rate	<i>TaxRate</i>	Bradford tax institute (2023)	Rate (%): social security tax rate plus Medicare tax rate
Lending interest rate	<i>InterasetRate</i>	World Bank (2022)	Rate (%): lending rate from banks for short- and medium-term financing needs in private sector
Income	<i>IncomeL20, IncomeL40, Income60, IncomeU40, IncomeU20</i>	U.S. Census Bureau (2022)	Rate (%): number of employed working age in income category / total working population (18-64)
Private sector employment	<i>private</i>	U.S. Bureau of Labor Statistics (2023a)	Rate (%): number of employees in private employment / total employment
Employment	<i>employed</i>	OECD (2022b)	Rate (%): total employed population (18-64) minus self-employed population
Self-employment	<i>selfempl</i>	OECD (2022d)	Rate (%): number self-empl / total employed population (18-64)
Non-agricultural employment	<i>NonAgEmpl</i>	U.S. Bureau of Labor Statistics (2022e, 2022f)	Rate (%): percent of employed population (18-64) in the non-agricultural sector
GDP per capita growth	<i>GDPPCG</i>	World Bank (2022)	The gross domestic product divided by midyear population

Table A1 (continued)

Political party	<i>PolParty</i>	U.S.: Encyclopaedia Britannica (2023) U.K.: Gov.UK (2023)	Dummy: 1 for Republican and 0 for Democrat
<b>Chapter 4: Essay 3</b>			
Self-employment	<i>selfempl</i>	OECD (2022d)	Rate (%): number self-empl / total employed population (18-64)
Gender	<i>TEAMale</i> , <i>TEAFemale</i>	APS Global National Level Data GEM 2002- 2018	Rate (%): percentage of respondents that are male and percentage of respondents that are female
Age	<i>TEA1824</i> , <i>TEA2534</i> , <i>TEA3544</i> , <i>TEA4554</i> , <i>TEA5564</i>	APS Global National Level Data GEM 2002- 2018	Rate (%): percentage of people in each age category involved in TEA
GDP per capita	<i>GDPPCG</i>	World Bank (2023)	Rate (%): gross domestic product / midyear pop
Motive	<i>MotiveOpp</i> <i>MotiveNess</i>	APS Global National Level Data GEM 2002- 2018	Rate (%): percent yes to the question of the motivation to enter self- employment
Education attainment	<i>TEASecEd</i> , <i>TEASecEdGrad</i> , <i>TEAPostSecEd</i> , <i>TEAGrad</i>	APS Global National Level Data GEM 2002- 2018	Number of adults per 100 as the highest level of education attained within each category
Work status	<i>TEAWorking</i>	APS Global National Level Data GEM 2002- 2018	Rate (%): percent yes to the question on if the person was wage employed when they entered self-employment



Table A1 (continued)

Income	<i>TEALowIn</i> , <i>TEAMidIn</i> , <i>TEAHiIn</i>	APS Global National Level Data GEM 2002- 2018	Rate (%): percentage of respondents that are currently in each income category
MIMIC	<i>mimic</i>	Medina and Schneider (2019)	Score: includes tax burden, institutional quality, openness to trade, unempl, currency use, labor force participation, and the size of the economy
Number of established businesses	<i>NumEstBus</i>	APS Global National Level Data GEM 2002- 2018	Number: actual count of new businesses in a given year
Geographical location	<i>d1</i> , <i>d2</i> , <i>d3</i>	APS Global National Level Data GEM 2002- 2018	Dummy: GEM divided into 4 categories (Middle East and Africa, Central and East Asia, Latin America and Caribbean, and Europe and North America)
Country status	<i>g1</i> , <i>g2</i>	APS Global National Level Data GEM 2002- 2018	Dummy: GEM categorized by like economic status (i.e., factor-, efficiency-, or innovation -driven)
Unemployment	<i>unempl</i>	World Bank (2023)	Rate (%): number unemployed / total working age pop (18-64)
Shocks	<i>shocks</i> <i>y75</i> , <i>y81</i> , <i>y82</i> , <i>y93</i> , <i>y09</i> , and <i>y20</i>	OECD (2022c) World Bank (2022)	Dummy: 1 is one SD increase in unemployment and decrease in GDPPCG and 0 otherwise.

## APPENDIX B – Chapter 3 fixed vs random effects data analysis

Appendix B includes the fixed-effects model run for the combined data of the United States and the United Kingdom. A fixed effect, or unobserved, model is designed to study the changes within a panel (Torres-Reyna 2007; Wooldridge 2019). These panels (countries in this case) have individual characteristics that may or may not influence either the dependent variable, the independent variables, or both. The individual characteristics are not random in any variables, so we must control them. Additionally, since the fixed effects model controls for time-invariant differences between panels it cannot be biased because of omitted time-invariant characteristics (gender, race, culture, religion, etc.) (Torres-Reyna 2007). In the random effects model the variation across panels is assumed to be random and uncorrelated with the dependent and independent variables. It can also include time-invariant characteristics as they are not absorbed into the intercept like in the fixed effects model (Torres-Reyna 2007).

The combined model is concluded to be a random effects model as the p-value is 0.6585, which is greater than 0.05. Additionally, the  $\sigma_u$  (.0932), which is the standard deviation of the residuals within the groups is smaller than  $\sigma_e$  (.2196), which is the standard deviation of the residuals of the overall error term (Torres-Reyna 2007). Another test to verify which model to use (fixed or random) is the Hausman test, which tests whether the individual characteristics are correlated with the independent variables (Torres-Reyna 2007; Wooldridge 2019). The p-value of the Hausman test yields a 0.6560, which is not low enough to reject the null hypothesis that there are no random effects. Therefore, the random effects model should be used (Torres-Reyna 2007).

To verify the results of the random effects model, the Breusch and Pagan Lagrangian multiplier test is run to determine if there is a cross-sectional dependence, also known as a panel effect (Torres-Reyna 2007). After the fixed effects model was run, the BP-LM test had a chi2 (1) of 0.833 and a Pr of 0.3614, which confirms that the panels (US and UK) are not correlated and there is no cross-sectional dependence. Additionally, the BP-LM test is run on the random effects model and provides a chibar2 (1) of 0.00 and Pr of 1.000, which concludes that there is a significant difference across the panels and OLS should be used for further analysis (Torres-Reyna 2007). Tables B1 and B2 provide statistical data on the Hausman test and fixed vs random effects model outputs. Table B1 provides that the lag of self-employment and political party in office are the significant factors that affect self-employment. Table B2 confirms that the model is a random effects model.

Table B1.

Hausman results of fixed vs random effects models on combined panel model

	(1) (b) Fixed Effects	(2) (B) Random Effects	(3) (b-B) Difference	(4) Standard Deviation
L.selfempl	.96*** (.026)	.961*** (.026)	-.001	.002
PolParty	.091* (.052)	.099** (.048)	-.008	.018
_cons	-2.262 (11.262)	-.612 (10.581)		
Observations	108	108		
r2_w	.984	.984		

Note: Additional variables not included above due to insignificance: unemployed, lag of unemployed, GDPPCG, NonAgEmpl, employed, shocks, InterestRate, time, time^2, y75unempl, y81unempl, y82unempl, y93unempl, and y20unempl.

Note: Standard errors are in parentheses \*  $p < .1$ ; \*\*  $p < .05$ ; \*\*\*  $p < .01$

Table B2.

Fixed-effects (within) regression output table

Number of obs	108	F(17,89)	315.71
Number of groups	2	Prob >F	0.000
Obs per group	Min 50	corr(u_i, Xb)	0.7144
	Ave 54	$R^2$ within	0.9837
	Max 58	$R^2$ between	1.000
Group variable	panel	$R^2$ overall	0.9919
sigma_u	.0932	F(1, 89)	0.20
sigma_e	.2196	Prob > F	0.6585
rho	.1527	Chi2 (1)	0.20
		Prob>chi2	0.6560

Note: The sigma\_u is less than the sigma\_e, which confirms that the model is a random effects model.

## APPENDIX C – Chapter 4 fixed effects vs random effects data analysis

Appendix C includes the fixed-effects model run for the GEM data. A fixed effects, or unobserved, model is designed to study the changes within a panel (Torres-Reyna 2007; Wooldridge 2019). These panels (countries in this case) have individual characteristics that may or may not influence either the dependent variable, the independent variables, or both. The individual characteristics are not random in any variables, so we must control them. Additionally, since the fixed effects model controls for time-invariant differences between panels it cannot be biased because of omitted time-invariant characteristics (gender, race, culture, religion, etc.) (Torres-Reyna 2007). In the random effects model the variation across panels is assumed to be random and uncorrelated with the dependent and independent variables. It can also include time-invariant characteristics as they are not absorbed into the intercept like in the fixed effects model (Torres-Reyna 2007).

The model was concluded to be a fixed effects model as the p-value is 0.000, which is less than the 0.05 threshold. Additionally, the  $\sigma_u$  (6.375), which is the standard deviation of the residuals within the groups is larger than  $\sigma_e$  (2.66), which is the standard deviation of the residuals of the overall error term (Torres-Reyna 2007). Another test to verify which model to use (fixed or random) is the Hausman test, which tests whether the individual characteristics are correlated with the independent variables (Torres-Reyna 2007; Wooldridge 2019). The p-value of the Hausman test yields a 0.000, which is low enough to fail to reject the null hypothesis that there are no random effects. Therefore, the fixed effects model should be used (Torres-Reyna 2007).

Tables C1 and C2 provide statistical data on the Hausman test and fixed vs random effects model outputs.

Table C1.

Hausman results of fixed vs random effects models on GEM panel model

	(1) (b) Fixed Effects	(2) (B) Random Effects	(3) (b-B) Difference	(4) Standard Deviation
L.selfempl	.29*** (.044)	.435*** (.041)	-.1454	.0251
unempl	.24*** (.068)	.105** (.052)	.1348	.0540
TEAMale	.456*** (.171)	.326** (.165)	.1292	.0908
TEA3544	.222** (.109)	.207* (.113)	.0151	.0396
TEA5564	.157* (.095)	.13 (.094)	.0263	.0458
TEASecEd	-.14* (.077)	-.198** (.08)	.0585	.0266
TEAWorking	-.163** (.079)	-.033 (.078)	-.1302	.0400
L.TEAWorking	-.067 (.045)	-.116*** (.045)	.0489	.0214
TEAHiIn	.14** (.062)	.141** (.065)	-.0011	.0228
mimic	-.524*** (.106)	-.04 (.036)	-.4835	.1118
_cons	8.144*** (2.443)	-1.213 (.989)		
Observations	328	328		
r2_w	.749	.719		

Note: Additional variables not significant in model: GDPPCG, MotiveOpp, MotiveNec, TEA1824, TEA2534, TEA4554, TEAPostSecEd, TEALowIn, TEAMidIn, and NumEstBus.

Note: Standard errors are in parentheses \* $p < .1$ ; \*\* $p < .05$ ; \*\*\* $p < .01$

Table C2.

Fixed-effects (within) regression output table

Number of obs	328	F(20,263)	39.32
Number of groups	45	Prob >F	0.000
Obs per group	Min 1	corr(u_i, Xb)	-0.1342
	Ave 7.3	$R^2$ within	0.7494
	Max 12	$R^2$ between	0.4267
Group variable	CountryCode	$R^2$ overall	0.4865
sigma_u	6.375	F(44, 263)	5.73
sigma_e	2.266	Prob > F	0.000
rho	.8878	Chi2 (20)	73.19
		Prob>chi2	0.0000

Note: the sigma\_u is greater than sigma\_e, which confirms that the model is a fixed effects model.

## APPENDIX D – Chapter 4 countries in the study by GEM categories

Appendix D includes a list of the 50 countries included in essay three's study, categorized by the GEM regional group and income level. There was a total of 114 countries in the GEM data from 2002 to 2018. However, Chapter 4 includes only those countries that have three years of data or more and includes the shock year of 2009.

Table D1.

Countries by GEM development (income) category

<b>Regions</b>	<b>Factor-driven (Low income)</b>	<b>Efficiency-driven (Medium income)</b>	<b>Innovation-drive (High income)</b>
<b>1 (Middle East and Africa)</b>	Iran	South Africa	United Arab Emirates (UAE)
	Morocco	Tunisia	Israel
	Algeria	Lebanon	
	Uganda	Jordan	
		Saudi Arabia	
<b>2 (Central and East Asia)</b>		Malaysia	Japan
		China	South Korea
			Hong Kong
<b>3 (Latin America and the Caribbean)</b>	Venezuela	Peru	
		Argentina	
		Brazil	
		Chile	
		Columbia	
		Guatemala	
		Panama	
		Ecuador	
		Uruguay	
		Jamaica	
		Dominican Republic	
<b>4 (Europe and North America)</b>			
		Russia	United States



Table D1 (continued).

		Hungary	Greece
		Romania	Netherlands
		Latvia	Belgium
		Serbia	France
		Croatia	Spain
			Italy
			Switzerland
			United Kingdom
			Denmark
			Norway
			Germany
			Slovenia
			Bosnia and Herzegovina
			Iceland
			Finland

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