

Forfeited Benefits or Mitigated Losses? The Economic Impact of Not Having a Stock Market: A Synthetic Control Approach

Etsub Tekola Jemberu, Ph.D.

Doctoral Thesis Summary



Tomas Bata University in Zlín
Faculty of Management and Economics

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**Forfeited Benefits or Mitigated Losses? The
Economic Impact of Not Having a Stock Market: A
Synthetic Control Approach**

**Propadlé výhody nebo zmírněné ztráty? Ekonomický dopad
neexistence akciového trhu: Syntetický kontrolní přístup**

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ABSTRACT

Despite the flourishing of financial markets globally as a financial reform strategy over the last century, roughly one-sixth of countries worldwide are still without any formal stock exchange. Numerous studies have identified positive associations between well-functioning stock markets and economic growth. However, some researchers remain justly skeptical about their contribution, particularly in developing countries. In addition to this contention, so far, no substantive effort has been made to measure the impact of stock market unavailability on an economy. This dissertation aims to address this knowledge gap by examining the economic impact of stock markets' absence in countries lacking such exchanges. Using the synthetic control method (SCM), it estimates the level of economic output, investment, and employment that would have been realized in selected non-exchange countries had they established stock exchanges in 1994. The analysis findings reveal that while most countries forfeited substantial output gains without markets, they neither benefited nor incurred a cost in terms of investment. Exceptionally, Ethiopia appears to have benefited from not having a stock market, both in terms of output and investment gains. The employment impact, on the other hand, was found to be significantly positive for the Democratic Republic of Congo and Guinea. Robustness checks using alternative weight assignments largely confirmed the direction of the impacts estimated by the baseline analysis.

ABSTRAKT

Navzdory celosvětovému rozkvětu finančních trhů jako strategie finanční reformy v minulém století je zhruba šestina zemí na světě stále bez oficiální burzy cenných papírů. Četné studie zjistily pozitivní souvislosti mezi dobře fungujícími akciovými trhy a hospodářským růstem. Někteří výzkumníci však zůstávají k jejich přínosu, zejména v rozvojových zemích, oprávněně skeptičtí. Kromě tohoto tvrzení dosud nebyla vyvinuta žádná podstatná snaha o měření dopadu nedostupnosti akciového trhu na ekonomiku. Tato disertační práce si klade za cíl tuto mezeru ve znalostech odstranit zkoumáním ekonomického dopadu neexistence akciových trhů v zemích, kde tyto burzy chybí. Pomocí metody syntetické kontroly (SCM) odhaduje úroveň ekonomického výstupu, investic a zaměstnanosti, které by byly realizovány ve vybraných zemích bez burz, kdyby v roce 1994 zavedly burzy cenných papírů. Výsledky analýzy ukazují, že zatímco většina zemí bez trhů přišla o značný nárůst produkce, z hlediska investic jim to nepřineslo ani prospěch, ani náklady. Výjimečně se zdá, že Etiopie měla z neexistence burzy prospěch, a to jak z hlediska přírůstku produkce, tak z hlediska investic. Na druhé straně dopad na zaměstnanost se ukázal jako výrazně pozitivní v případě Demokratické republiky Kongo a Guineje. Kontroly spolehlivosti s použitím alternativních přiřazení vah do značné míry potvrdily směr dopadů odhadovaných základní analýzou.

CONTENTS

ABSTRACT	3
ABSTRAKT	3
LIST OF FIGURES	5
LIST OF TABLES.....	5
LIST OF ACRONYMS	5
1. INTRODUCTION	7
1.1 Background.....	7
1.2 Motivation.....	8
2. THEORETICAL BACKGROUND	10
2.1 Functions of stock markets	10
2.2 Skepticism towards stock markets benefits	12
3. RESEARCH DESIGN.....	14
3.1 Research problem	14
3.2 Research objectives.....	15
3.3 Methodology.....	15
3.3.1 <i>Synthetic control methods</i>	15
3.3.2 <i>Selection of the treated countries and control groups</i>	17
3.3.3 <i>Data, outcome variables, and predictors</i>	17
4. EMPIRICAL RESULTS	18
4.1 Economic output	18
4.2 Investment.....	22
4.3 Employment.....	26
4.4 Further robustness checks	29
4.5 Discussion.....	30
5. CONCLUSION AND IMPLICATIONS	34
5.1 Summary	34
5.2 Implications and Contributions.....	34
5.3 Limitations and Future Research	35
APPENDICES	37
REFERENCES	37
LIST OF PUBLICATIONS BY THE AUTHOR.....	43
CURRICULUM VITAE.....	44

LIST OF FIGURES

Fig. 4.1: GDP trends: Non-exchange countries vs. synthetic controls	19
Fig. 4.2: Placebo distribution – GDP as the outcome variable	21
Fig. 4.3: GCF trends: Non-exchange countries vs. synthetic controls	23
Fig. 4.4: Placebo distribution – GCF as outcome variable	25
Fig. 4.5: Employment rate GDP trends: Non-exchange countries vs. synthetic controls	27
Fig. 4.6: Placebo distribution - Employment as outcome variable	28

LIST OF TABLES

Table 4.1 Donor weights - GDP synthetic controls	18
Table 4.2 Effect of stock markets' absence on economic output	20
Table 4.3 Donor weights - GCF synthetic controls	22
Table 4.4 Effect of stock markets' absence on investment.....	24
Table 4.5 Donor weights - Employment rate synthetic controls	26
Table 4.6 Effect of stock markets' absence on employment rate	28
Table 4.7 Effect of stock markets' absence, SCUL	29
Table 4.8 Effect of stock markets' absence, SCM.....	30
Table A1 Predictor means in the pre-treatment period.....	41

LIST OF ACRONYMS

ATT	Average treatment effect on treated
DRC	Democratic Republic of Congo
IMF	International Monetary Fund
IFC	International Finance Corporation
GDP	Gross domestic product
GCF	Gross capital formation
PFI	Pre-treatment fit index
PWT	Penn world table
MSPE	Mean squared prediction error

RMSPE	Root mean squared prediction error
SCM	Synthetic control method
SCUL	Synthetic control with lasso regularization
TFP	Total factor productivity
WDI	World Bank development indicator
WFE	World federation of exchanges
V-Dem	Varieties of Democracy.

1. INTRODUCTION

1.1 Background

The focus of many earlier studies on the finance-growth nexus had been on analyzing the contribution of the banking sector. This emphasis is expected given that the financial systems historically were predominately bank-based, and data on banking sector development, such as growth in banks' assets and credits, has been more readily available than stock market data. However, as non-bank financing expanded globally in the 1980s and 1990s (Weber et al., 2009), academic research eventually widened in scope to include examining the impact of stock markets on economic growth.

In contrast to the dominant viewpoint on the positive links between banks and economic growth, the literature examining the influence of stock markets has yielded more mixed conclusions. While numerous studies suggest efficient, well-functioning stock markets can positively influence economic growth, as found by Beck and Levine (2004), Cooray (2010), Bui and Doan (2021), and others, some researchers remain skeptical about the magnitude and significance of this relationship (e.g. Bhide, 1993, Singh, 1997, Singh, 2008). This theoretical skepticism has gained some evidence in empirical studies like Nyasha and Odhiambo (2015) Pan and Mishra (2018) and Bae et al. (2021).

Financial development in both developed and developing countries in the last century has been characterized by a remarkable surge in the expansion of stock markets. The financial liberalization efforts undertaken in many emerging economies across Asia, Latin America, sub-Saharan Africa, and Eastern Europe in the last few decades have been featured by a strong drive towards setting up stock exchanges. Currently, numerous active stock exchanges worldwide facilitate the trading of securities. Notably, the World Federation of Exchanges (WFE) monitors around 90 major exchanges across developed and emerging markets in its reports. Despite this remarkable global proliferation, some developing countries still lack formal exchanges. Drawing on the analysis of the available sources, as of 2022, around one-sixth of the internationally recognized sovereign states do not have a stock exchange. Of these countries without an exchange, around half have a population exceeding one million people, and over a third are located in sub-Saharan Africa. While growth can be attributed to various factors, considering the prevalent findings of most studies indicating a positive association between efficient stock markets and economic growth, it is hardly surprising that the economic performance of these countries significantly trails in terms of key macroeconomic indicators like gross domestic product (GDP) and investment, compared to countries with well-established stock exchanges.

1.2 Motivation

In the past, international financial institutions such as the International Monetary Fund (IMF) and the World Bank have advanced the development of financial markets in developing countries as part of their financial reform agendas within the framework of structural adjustment programs (see, for example, World Bank, 1989, World Bank, 1994). Before the 1980s debt crisis, development aid and commercial bank loans were the primary sources of external capital flows supporting growth in emerging economies. However, after these flows failed to sustainably finance development and precipitated crises, financial institutions started to see liberalized capital markets as a more favorable alternative (Singh, 1997). The underlying assumption was that developing countries could attract non-debt-creating foreign capital by setting up and liberalizing stock markets instead of relying on external aid or debt financing. Thus, the IMF, World Bank, and other international agencies launched and funded various financial sector programs to provide advisory services, and financial and technical assistance for financial sector reforms, including forming new stock exchanges. Due to this international support and coercion, the number of countries with stock exchanges rapidly grew from 59 in 1980 to 113 by 2000 (Weber et al., 2009). An International Finance Corporation (IFC) retrospective report states that it helped create or revitalize exchanges in over 20 emerging economies during this period as part of its capital markets development work (International Finance Corporation, 2016).

However, the subsequent two decades highlighted that stock markets are susceptible to fluctuations and expensive and contagious financial crises. Contrary to the initial assumption of supporting economic development in developing countries, the decision to open stock markets brought about heightened volatility and short-term inflows. This, in turn, constrained the scope for effective macroeconomic policy responses to the oscillating nature of capital flows (United Nations, 2010). Consequently, the ‘one-size-fits-all’ approach to promoting stock market development in emerging economies by international financial institutions diminished in the 2000s (Maxfield, 2009). Particularly, the Asian financial crisis of the late 1990s and the global financial crisis of 2008 were big lesson-learning moments of capital market risks, resulting in the institutions’ partial abandonment of a mere stock exchange promotion.

The rapid pace of new stock exchange formation and development across emerging economies present in the 1980s – 1990s has slowed down in recent years. To be sure, international institutions have not entirely abandoned their commitment to supporting capital market development. Rather their emphasis shifted to reinforcing regulatory and supervisory frameworks and elevating corporate governance standards. Nevertheless, their level of support for forming new stock exchanges has declined since the early 2000s relative to the prior extensive assistance during the structural adjustment era. For instance, the

Independent Evaluation Group (2006) evaluated the World Bank's financial sector reform support from 1993 to 2003 and noted a drop in loans for capital markets between 2000 and 2003. The report highlighted that only ten capital market reform projects received loans in that period, contrasting with the 29 programs funded between 1996 and 1999. Moreover, it would be simplistic to believe that the shift in emphasis after the global financial crisis was limited to financial institutions alone. Developing countries themselves probably felt compelled to reassess their priorities, including their pursuit of establishing new stock exchanges.

The crises underscore the importance of establishing strong supportive institutions before introducing a stock exchange into an economy. The formation of a well-functioning stock market hinges upon the existence of certain economic, legal, institutional, social, and political conditions. These pre-requirements include macroeconomic stability, capable and independent regulatory and supervisory entities, well-defined accounting standards and financial disclosure requirements, investor protection mechanisms, and well-developed market infrastructure at a minimum (Singh, 1997, La Porta et al., 2002, Adjasi and Yartey, 2007). However, implementing these prerequisites demands a substantial commitment and the devotion of significant scarce public resources. With countries now less able to rely on multilateral financial support for new exchanges compared to the 1990s, the need for comprehension of the potential benefits and costs of a stock market is more pertinent than ever. A rigorous assessment of whether a new exchange can deliver value aligned with present economic conditions and priorities is essential, especially when domestic sovereign funds would be needed to finance the endeavor rather than depending on external assistance.

Given the aforementioned complex historical experience and evolving perspectives on stock market impacts, there is a need for empirical analysis quantifying the potential economic losses of lacking an exchange result. Within this context, the current dissertation examines how much the absence of a stock market costs economies in terms of key macroeconomic indicators such as economic output, investment, and employment losses. Utilizing advanced statistical techniques to construct counterfactual comparisons, the research intends to provide nuanced evidence regarding the significance of exchanges. By doing so, it aims to contribute to academic discourse and provide valuable insights for policymakers in developing countries who are deliberating on the establishment of new stock exchanges within the current developmental landscape and priorities.

2. THEORETICAL BACKGROUND

2.1 Functions of stock market

i. Saving mobilization and allocation of resources

Stock markets allow for a broad mobilization of savings by providing a platform for a large and diverse set of investors to participate. Financial instruments that are traded in the market are typically in small denominations. This encourages a larger fraction of the population to take part. An ordinary household can easily diversify its portfolio and increase its asset liquidity by investing in different firms with promising prospects. Furthermore, markets offer individuals a range of alternative saving instruments that likely align with their liquidity, return, and risk preferences. This stimulates higher household saving rates and increases the aggregate volume of investable savings in the economy.

In addition to mobilizing savings, stock markets allocate the pooled capital to its most efficient uses. In the course of pooling funds from many diverse investors, stock markets make capital accessible to the production sector, expanding the set of feasible investment projects. Oftentimes, individual savers are incapable or unwilling to finance long-term investment projects that tie up their assets for extended periods. With stock markets, however, many diverse individuals can fund such projects while having the option of exiting their investment easily by trading their shares on secondary markets without disrupting the project operations. Besides, prices in efficient stock markets incorporate information about investment prospects. Hence, they guide investors' decisions, which results in funding only promising projects with strong potential returns. This function of stock markets in optimizing the allocation of mobilized savings into their highest-value uses is well illustrated by Greenwood and Jovanovic (1990), and Greenwood and Smith (1997).

ii. Liquidity provision

Stock markets can foster economic growth through the provision of liquidity. Economies typically have many potential production projects with different gestation periods. Some projects require a shorter period of time to produce capital, while others may take a relatively longer time. Particularly, the gestation period for major investment projects is lengthy and requires a long-term allocation of funds. However, most investors are less interested in long-term investments that can block their savings for long periods. Stock markets alleviate this strain by allowing investors to hold easily tradable shares rather than tying up capital directly. This encourages investors to fund long-term promising investment projects they would otherwise avoid.

At the same time, this feature of stock markets allows capital to remain invested in the investment project for the long run. The trading of shares in the secondary

market has little to zero effect on the actual investment being undertaken. This prevents premature withdrawal of capital from projects as investors trade ownership claims to meet their short-term liquidity needs (Greenwood and Smith, 1997). Consequently, by improving capital allocation and retention, the liquidity provided by stock markets spurs long-term investments that are essential for economic growth.

iii. Better risk management

Stock markets play a crucial role in enhancing risk diversification within the economy. They offer a wide array of financial instruments and investment opportunities, allowing investors to hold a diversified portfolio. Investors can spread their risk across different investment options rather than investing their whole savings in just a few assets. Stock markets also bring together a large and diverse set of investors. This enables multiple investors to collectively share and mitigate the idiosyncratic risks associated with a specific investment project. As Levine (1991), states, one such risk is a productivity risk that stems from shocks a project may experience during its production regime. Stock markets, especially internationally integrated ones, reduce the average productivity risk that investors are exposed to. In addition, they insure investors against liquidity risks. In liquid stock markets, investors can convert their assets into exchangeable medium, or cash, easily and quickly whenever the need arises. Market participants do not need to invest their time and energy in searching for a buyer for their shares, nor do they need to negotiate the transaction terms. The continuous trading mechanisms provided by stock markets enable them to transfer their claims to another participant, following the predefined market rules.

iv. Information production about investment opportunities

Stock markets also boost growth by promoting the production of information about investment opportunities in the economy. Prices in stock markets aggregate diverse pieces of information about the underlying investment from many different market participants and incorporate them (Dow et al., 2017). This incentivizes participants to actively produce information. On the one hand, as investors have their savings at risk of loss, it is in their best interest to gather timely and accurate data regarding potential investment opportunities. Hence, they engage in thorough research and monitor projects to maximize their expected return. Additionally, investors who acquire superior and early information can make greater profits than those who have not. On the other hand, managers also have incentives to produce information about the projects they want to be funded through stock markets. Stock market listing requirements typically mandate firms to disclose information about their investment projects to the public. Therefore, managers produce such information to meet regulatory requirements. Furthermore, they can strategically maximize the value of their projects by

revealing additional information that may not be readily available in the market (Goldstein and Yang, 2017).

v. Promotion of corporate governance

Stock markets stimulate better corporate control by enabling shareholders to exert control over firms. Investors voting rights, board representation, and engagement with management incentivize them to finance projects and monitor execution. Additionally, stock markets facilitate takeovers as a disciplinary mechanism and allow tying managerial compensation to share prices. This deters managers from pursuing self-serving actions that can lower the firm value and mitigate agency problems. Moreover, stock markets improve corporate governance by promoting adherence to governance regulations and best practices. Markets typically have a set of rules and regulations, such as governance standards, disclosure requirements, and voluntary codes, that compel firms to demonstrate found governance practices.

2.2 Skepticism towards stock markets benefits

As the discussion in the prior sections attempted to establish, there is a substantial body of theoretical literature that stresses the significance of stock markets in the process of economic growth. Nevertheless, not everyone shares these views. Some economists are not entirely convinced of these perceived benefits and contend that they may be overstated or have significant downsides.

Bhide (1993) and Back et al. (2013) argue that the benefit of stock markets in terms of liquidity provision comes at the expense of losing strong corporate governance and internal monitoring in firms. Since investors can easily sell their shares at any time, stock market liquidity may discourage them from having a long-term commitment to firms whose shares they own. Therefore, they might be reluctant to exert strong corporate control. Moreover, Fang et al. (2014) suggest that heightened liquidity might hinder firm innovation and encourage short-termism, by pressuring managers to prioritize short-term profit-driven strategies and cut investments in innovation.

Bolton et al. (2006) present a model that explores the drawbacks of linking managers' compensation to share prices. In particular, they show that such compensation contracts can induce managers to engage in short-term strategies that increase share price and neglect long-term value-increasing strategies. This fuels speculative trading and stock overvaluations. Similarly, Benmelech et al. (2010) examine how stock-based compensation can lead to suboptimal investment. According to their analysis, when managers' pay is tied to stock performance, it motivates managers to withhold information if investment opportunities weaken, resulting in capital allocation to investments that are not value-maximizing in the long run.

Other functions of stock markets have also faced skepticism. Peress (2010) and Van Nieuwerburgh and Veldkamp (2010) highlight the inherent tradeoff between risk-sharing and information production roles. While Peress's theoretical model illustrates how a larger investor base enhances risk diversification but discourages information acquisition, Van Nieuwerburgh and Veldkamp show how acquiring more information about an asset can hinder optimal diversification. Moreover, the resource allocation role of stock markets has also faced skepticism. Stiglitz (1972) and Stiglitz (1982) discuss the non-optimality of stock markets' allocation by highlighting how firms' objective of maximizing shareholder wealth can lead to Grossman and Stiglitz (1980), further, demonstrate that perfect informational efficiency in financial markets cannot be satisfied in actual competitive market. Prices do not perfectly incorporate all available information because if they did, investors would not have incentives to incur costs to acquire information.

However, most critiques of stock markets stem from their vulnerability to instability. Minsky (1992) argues that at times of economic expansion, agents in capitalist economies become progressively more optimistic and start to engage in risky investments using external finances, which ultimately can lead to economic recession. Stiglitz (2000) presents a case against capital market liberalization, suggesting such capital inflows are highly volatile, which exposes countries to external economic shocks, and short-term, which discourages long-term investments.

In the case of developing economies, researchers point out that most low-income countries often fail to establish the necessary conditions for stock markets to function efficiently and deliver the aforementioned functions to the economy. Hence, Sharma and Roca (2012) argue that such institutions in developing economies may be less beneficial than previously thought and might not be worth the redirection of scarce resources away from potentially more advantageous sectors. Similarly, Singh (1997) underscores some stock markets' inherent features, such as volatility, their interactions with the currency market, and their potential to weaken existing banking systems, which can impede economic growth rather than promote it.

3. RESEARCH DESIGN

3.1 Research problem

Numerous studies have explored the relationship between stock market development and different aspects of economic growth. The majority of studies examining the impact on output have taken a macro-level approach, using variables like GDP or GDP per capita, and measuring stock market development in terms of size, liquidity, and trading activity increments. Although many of these studies find positive associations, some exceptions have reported negligible, non-monotonic, and even negative relationships. There is not a consensus about the effect of stock market development on investment either. The research on the subject ranges from macroeconomic analysis that assesses the impact on economywide capital formation or investment rate to micro-level investigations that examine how equity financing accessibility affects investment spending within industries or firms but equally yields conflicting evidence. Similarly, the limited empirical work focusing on the relationship between stock markets and labor market outcomes like employment and wage growth has yet to establish definitive conclusions. Therefore, our understanding of the effect of stock market development on economic growth remains tentative, which calls for more focused examinations that can account for country-specific factors.

Another issue pertains to the research methods that have been employed to examine the stock market-growth relationship. Typically, empirical analyses on the subject are either cross-country panel data examinations or single-country time-series studies. However, both approaches have been subject to criticism. While endogeneity issues arising from omitted variables bias and self-selection is a challenge in cross-country studies, the lack of a clearly defined counterfactual and concerns of unreliable extrapolation beyond the scope of the data restrict the generalizability of findings from time-series analyses of individual countries to other countries.

Moreover, existing research has mainly been confined to studying stock market development's impact on the economy of countries with established markets. However, an equally important question is whether the economic growth of the countries without stock markets would have been better off or worse off had they created one. Broadening the analysis to incorporate counterfactual evaluations for countries without stock exchanges can offer valuable supplementary perspectives on the effect of stock markets.

In light of these, this thesis examines the economic implications of stock markets by looking at countries that do not own one yet. To my knowledge, this is the first study that attempts to quantify the counterfactual economic gain that non-exchange countries would have enjoyed had they had an exchange. In addition, to address the abovementioned methodological issues, it adopts a comparative case study approach by employing the synthetic control method. The

method combines both cross-country panel data and country-specific time series analyses' strengths while addressing some of their limitations.

3.2 Research objectives

The general objective of this thesis is to estimate the unrealized economic benefits of stock markets for countries that currently lack an exchange. To be more specific, it aims to accomplish the following objectives:

- i. To assess and compare the economic growth of countries without a stock exchange with a set of selected countries that have stock exchanges in terms of key macroeconomic indicators including output, investment, and employment.
- ii. To quantify the unrealized economic gains due to the lack of stock markets across key macroeconomic indicators, i.e., output, investment, and employment for countries without a stock exchange.
- iii. To evaluate whether establishing a stock exchange in countries without one would have improved or worsened economic outcomes.

3.3 Methodology

3.3.1 Synthetic control methods

To achieve the research objectives, a transparent data-driven econometric technique called the Synthetic Control Method (SCM) is applied. The method which was first introduced by Abadie and Gardeazabal (2003) and extended by Abadie et al. (2010) and Abadie et al. (2015), provides a systematic way of constructing synthetic controls that show the growth path that would have been achieved in these countries if they had stock markets. These synthetic control units are constructed based on weighted averages of the units in the donor pool - a set of potential comparison units that have stock exchanges, in which the weight represents the contribution of each comparison unit to the counterfactual of interest. Once the counterfactual units are constructed, the cost of lacking a stock market can easily be measured as the difference between the outcome of the non-exchange countries and their counterfactuals in the post-exchange period.

More formally, suppose we are observing a panel of $J + 1$ countries over the period $t = 1, 2, \dots, T_0, T_0 + 1, \dots, T$. While the first country does not start a stock market, the other J countries with stock markets established in the year T_0 represent the donor pool. Also, let Y_{jt} denote the outcome of interest for country j at time t . Conceptually, the economic impact that country 1 experienced, τ_{1t} , at time $t > T_0$, due to its lack of a stock market can be defined as:

$$\tau_{1t} = Y_{1t}^{NM} - Y_{1t}^M \quad (3.1)$$

where, Y_{1t}^{NM} is the observed factual outcome of country 1 under no stock market, and Y_{1t}^M is its potential outcome under the presence of a stock market. However, Y_{1t}^M is not observable since, in reality, country 1 is without a stock market for the

whole study period. To accurately estimate the impact of the stock market's absence on country 1, a credible counterfactual that approximates Y_{1t}^M must be constructed.

Abadie et al. (2010) propose estimating the counterfactual as a weighted average of the countries in the donor pool. w_j^* denoting estimated time-invariant weights assigned to each donor country j , This can be formulated as:

$$\hat{Y}_{1t}^M = \sum_{j=2}^{J+1} w_j^* Y_{jt} \quad (3.2)$$

SCM relies on an optimization procedure to find a set of weights that produce a synthetic control for country 1 that closely replicates its characteristics and outcome trajectory during the pre-stock market period. Hence, given a vector of weights $W = w_2, w_3, \dots, w_{J+1}$, the objective is to solve the following optimization problem subject to non-negativity and summing up to one constraint:

$$\begin{aligned} \min_W & \sqrt{(X_1 - X_D W)' V (X_1 - X_D W)} \\ \text{Such that: } & \sum_{j=2}^{J+1} w_j = 1 \text{ and} \\ & w_j \geq 0 \text{ for } j = 2, 3, \dots, J + 1 \end{aligned} \quad (3.3)$$

Here, X_1 and X_D are a vector and a matrix of pre-stock market characteristics (covariates and outcomes) for country 1 and J donor countries, respectively. V is a matrix of non-negative diagonal elements representing the relative importance of the pre-stock market characteristics in predicting the outcome. The constraints on the weights are to avoid extrapolation, and hence ensuring the counterfactual outcome values lie within the support of the available data. While there are various approaches to determining V , in this thesis, following Abadie and Gardeazabal (2003) and Abadie et al. (2010), optimal predictor weights that minimize the mean squared prediction error (MSPE) of the synthetic control with respect to Y_{1t}^M during the pre-stock market period are selected. The resulting V^* is then used to estimate the optimal donor countries' weight $W^* = W^*(V)$ according to equation (3.2). Once these weights are obtained, the impact of stock market absence on economic growth can easily be calculated as:

$$\hat{t}_{1t} = Y_{1t}^{NM} - \sum_{j=2}^{J+1} w_j^* Y_{jt} \text{ for all } t \in T_0, \dots, T \quad (3.4)$$

To evaluate the significance of the estimated treatment effects, the thesis employs placebo analyses. This entails iteratively subjecting each donor country to SCM estimation as if it had not already established its stock market at T_0 . The other countries in the donor pool, including the treated, serve as placebo-control countries. Then, these pseudo-effects are compared to the effect estimated for the non-exchange countries. If the placebos exhibit large treatment effects relative to

the estimated effect on the non-exchange countries, this will imply that there is no statistically significant evidence of lost effect from lacking stock markets.

3.3.2 Selection of the treated countries and control groups

In a typical impact evaluation study, ‘treatment’ refers to exposure to an intervention, with treated units being those exposed and control units being unexposed. In this dissertation, however, what is being evaluated is the impact of the absence of an intervention, the intervention being a stock market formation. Hence, ‘treatment’ is defined as a stock market absence in a country, making countries that lack an exchange treated and those that established one during the treatment year controls. Accordingly, taking SCM’s data requirement, data availability, and relevance into account, six countries without a stock exchange, i.e., Burundi, Democratic Republic of Congo (DRC, henceforth), Ethiopia, Guinea, Liberia, and Madagascar, are selected for the analysis. These countries are referred to as ‘non-exchange countries’ or ‘treated countries’, interchangeably, throughout the text. To ensure the availability of a robust pool of potential donor countries that can provide a credible counterfactual, 1994 is selected as a treatment year. This resulted in the selection of seven other countries that established their stock exchanges in 1994, or at most one year prior or later, to construct the donor pool: Bhutan, Botswana, Cyprus, Malawi, Nepal, Romania, and Zambia. The thesis refers to these countries as either ‘control countries’ or ‘donor countries.’

3.3.3 Data, outcome variables, and predictors

To estimate the forgone benefit of stock markets in the selected countries without exchanges while adhering to SCM data requirements, a panel dataset encompassing annual observations from 1970 to 2019 for 14 countries, both with and without stock markets is constructed. With the selected treatment year set at 1994, this yields 24 pre-exchange and 25 post-exchange years. The dataset is constructed by using Penn World Table (PWT) version 10.01. as a main data source. This data is supplemented by the World Development Indicators (WDI), IMF’s Financial Development Index database, and Varieties of Democracy (V-Dem) data.

The thesis uses three key macroeconomic indicators to evaluate the economic performance of the selected non-exchange countries and estimate their hypothetical trajectories had they established an exchange: Output, investment, and employment. While output is measured in terms of output side real GDP, investment is captured by gross capital formation (GCF). Furthermore, employment ratio is used to gauge labor market impact. To predict the GDP paths of the synthetic controls, along with the pre-exchange values of GDP per capita, a set of covariates including inflation, population growth, financial institution development, and democracy are incorporated.

4. EMPIRICAL RESULTS

This chapter presents and discusses the results of the empirical analysis. The results of the SCM experiments are presented in three parts. In the first section, the counterfactual economic output levels that would have been realized in the treated countries had they had stock exchanges are estimated. The potential gains in terms of investment are estimated and discussed in the second section. The third section gives the results for employment. To draw causal inferences and check the robustness of the results, each subsection includes a placebo analysis.

4.1 Economic output

Before discussing SCM estimates of the treatment effects in terms of the forgone economic output, examining the donor elements used to construct the treated countries' synthetic controls is prudent. Table 4.1 lays out the weights assigned to each country in the donor pool in creating the synthetic counterfactuals. Aside from Botswana, SCM places non-zero weights on the other control countries in the composition of more than one synthetic control. Romania and Zambia account for substantial non-zero weights in most treated countries (five out of six). Malawi also contributed to the construction of four countries. The most minor contributor is Cyprus. This could be partially due to its pre-exchange income level being different from that of the non-exchange countries. Around 67 percent of the synthetic controls use more than half of the donor countries with non-zero weights for their construction. Only two synthetics, namely synthetic DRC and synthetic Liberia rely on less than half of the potential control countries in the donor pool.

Table 4.1 Donor weights - GDP synthetic controls

Control countries	Treated countries					
	Burundi	DRC	Ethiopia	Guinea	Liberia	Madagascar
Bhutan	0.703	0	0	0	0.748	0.068
Botswana	0	0	0	0	0	0
Cyprus	0.044	0	0.101	0	0	0
Malawi	0.246	0.61	0	0.394	0	0.516
Nepal	0	0	0.404	0.405	0	0.065
Romania	0.007	0.297	0.112	0.05	0	0.035
Zambia	0	0.092	0.382	0.151	0.252	0.316
PFI	0.06	0.28	0.10	0.11	0.35	0.11

Source: Generated by the author using the *synth* command in Stata 17.

The estimated country weights are then used to compute the synthetic controls' GDP paths. Fig. 4.1 plots the evolution of GDP in the six non-exchange countries, the solid lines, and their synthetic counterparts, the dashed lines, over the study period. The vertical dashed lines mark the year stock exchanges were established in the donor countries. Ideally, in SCM, the real observed and synthetically constructed paths should closely follow each other until the treatment year, so that post-treatment divergence can represent the intervention effects. A visual inspection of the graphs in Fig. 4.1 shows that the GDP trajectories largely meet this goal. The non-exchange countries and their corresponding synthetic controls follow similar GDP trends during the pre-exchange period. The exceptions are synthetic Liberia and DRC, which show considerable deviations from the real trends before 1994. However, notably, the graph illustrates a better alignment between the synthetic and real DRC approaching the treatment year.

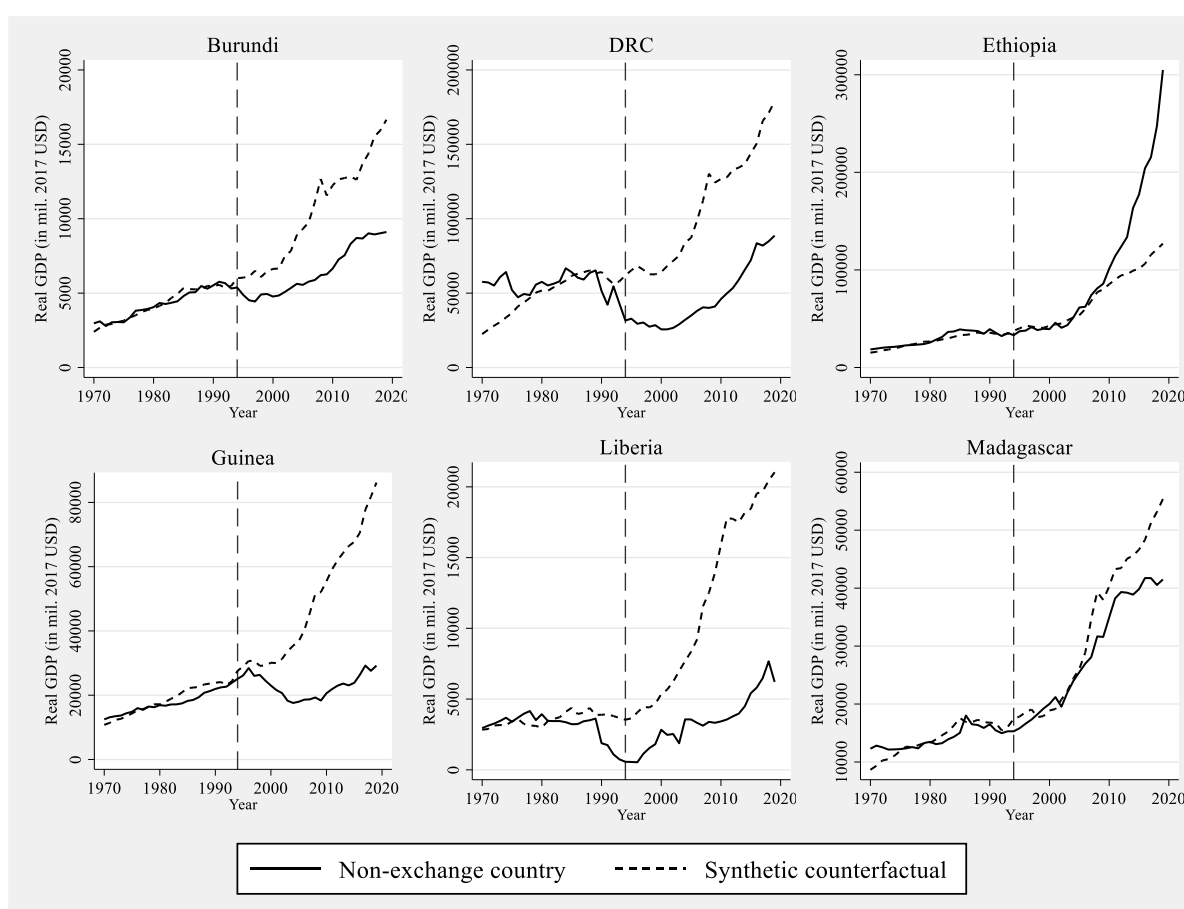


Fig. 4.1: GDP trends: Non-exchange countries vs. synthetic controls

Source: Generated by the author using the *synth* command in Stata 17.

To quantitatively evaluate the quality of the matches further, the pre-exchange goodness of fit is assessed using the pre-treatment fit index (PFI) proposed by Adhikari and Alm (2016). While lower index values closer to zero represent an excellent fit, an index below 1 indicates a satisfactory fit. However, an index above 1 suggests a poor fit. The PFIs for each non-exchange country's synthetic controls are reported in the last row of Table 4.1. The results show that all the pre-

treatment fit indices are below 1, indicating that the synthetic controls satisfactorily replicate the evolution of GDP in countries without stock exchanges during the pre-exchange period.

Moreover, as the figure demonstrates, the synthetic controls with stock exchanges outperform the non-exchange countries in five out of six cases in the post-exchange period, indicating that lacking a stock exchange carries certain inaction costs in terms of economic output. However, the opposite is observed in Ethiopia. While the two lines appear almost to overlap until the middle of the post-treatment period, the real Ethiopia path experiences a dramatic surge in GDP after 2010 relative to its synthetic counterpart.

Table 4.2 Effect of stock markets' absence on economic output

Countries without exchanges	Actual GDP	Synthetic Control GDP	ATT
Burundi	6,492.54	10,495.13	-38.14%
DRC	46,679.63	108,348.7	-56.92%
Ethiopia	102,648.3	72,544.63	41.50%
Guinea	22,956.52	49,068.67	-53.22%
Liberia	3,454.59	11,796.22	-70.71%
Madagascar	29,352.94	33,448.96	-12.25%

Source: Generated by the author using the *synth* command in Stata 17.

To show the treatment effects in terms of economic output more clearly, Table 4.2 reports the average GDP over the post-treatment period for the countries without stock exchange and their synthetic counterparts. It also calculates the average treatment effects (ATT) as percentage differences between the non-exchange countries and their corresponding synthetic controls. The results indicate that almost all the non-exchange countries have had average GDPs that are lower than their synthetic equivalents in the post-exchange period. On average, their lack of a stock market resulted in a loss of GDP value between 12 and 70 percent during the period from 1995 to 2019. Liberia stands out as a country that has lost a large GDP augmentation with a 70.71 percent difference. On the contrary, the table shows that Ethiopia has benefited from the absence of an exchange within its economy. It has experienced 41.5 higher GDP than it would have been had the country established a stock exchange in 1994.

Placebo tests

To ensure the reliability of the result presented above, following Abadie et al. (2010), a series of placebo tests are performed. This is carried out by estimating pseudo-treatment effects on the control countries and comparing them with the

real treatment effects on the treated countries. To avoid comparing the real treatment effects with pseudo effects estimated based on poorly matched placebos, the placebo countries whose PFI are five times greater than that of the treated country under consideration are dropped from the analyses.

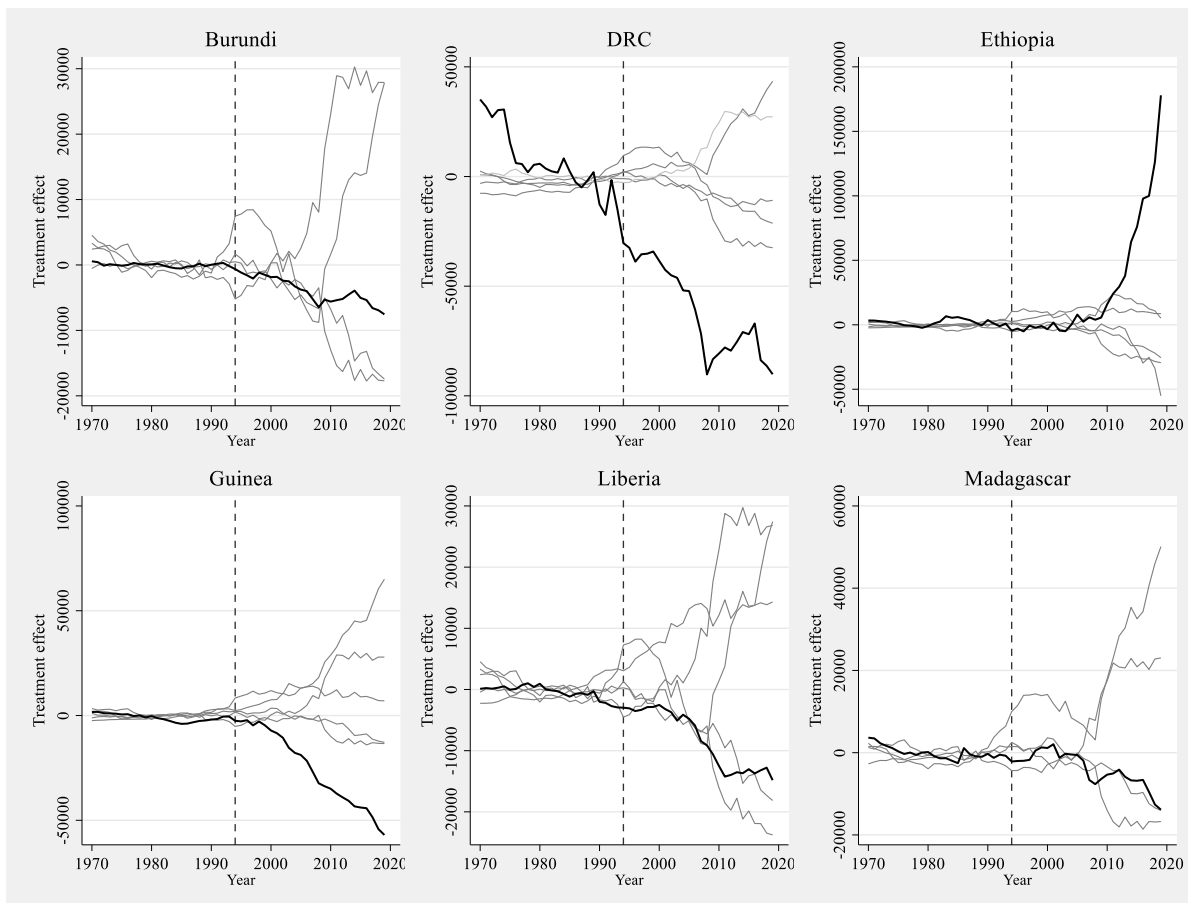


Fig. 4.2: Placebo distribution – GDP as the outcome variable

Source: Generated by the author using the *synth* command in Stata 17.

Fig. 4.2 displays the results from the placebo experiments¹. The solid black line shows the gap in GDP between the non-exchange countries and their synthetic controls. The light gray lines represent the gaps for the control countries. The statistical significance of the SCM results discussed above can be tested by examining whether the black lines showing the estimated effects for the treated countries lie below all the gray placebo effect lines (if the estimated effect is negative) or above all the gray lines (if the estimated effect is positive).

Largely, the results of the placebo tests corroborate the main findings. In particular, the post-exchange period treatment effect paths of DRC and Guinea are prominently below that of the control countries, validating their significant negative impacts from lacking a stock market. Ethiopia’s seemingly positive

¹ Despite Romani being within the pre-treatment fit index cutoff in two cases, DRC and Liberia, it has an extremely positive placebo effect, and therefore, it is excluded from the graphs to avoid skewing the scale and obscuring the comparison with other control countries.

benefit from missing an exchange also holds against the placebo comparisons. Among the four control countries retained within the PFI cutoff, Madagascar has the second lowest treatment effect. Similarly, Liberia ranks the second lowest out of five potential control countries included. However, Burundi’s estimated treatment effect lies well within the placebo distribution, ranking only third lowest compared to the four controls remaining in the experiment. This casts doubt on the robustness of the negative impact of a stock market’s absence in Burundi, as presented in Fig. 4.1 and Table 4.2. Nonetheless, it is worth mentioning that with few control countries in the experiments, even without the PFI cutoff, it is difficult to draw strong conclusions about the statistical significance of the estimated impacts of lacking stock markets in general. Therefore, these results must be treated with caution.

4.2 Investment

Next, the thesis examines the impact of stock markets’ absence on the investment level of the non-exchange countries. This is done by repeating the analyses in the previous section using the annual GCF as the outcome variable. While the predictors used for the SCM applications are the same as the analysis for the economic output, due to missing data on the outcome variable for one of the control countries, the study period starts in 1971. Therefore, the analysis has 23 pre-exchange and 26 post-exchange years for each case study.

Table 4.3 Donor weights - GCF synthetic controls

Control countries	Treated countries					
	Burundi	DRC	Ethiopia	Guinea	Liberia	Madagascar
Bhutan	0.784	0	0.203	0.406	0.777	0.434
Botswana	0	0	0.391	0	0	0.36
Cyprus	0	0	0.163	0	0	0
Malawi	0.216	0.762	0.185	0.564	0.223	0
Nepal	0	0	0	0	0	0
Romania	0	0.238	0	0	0	0
Zambia	0	0	0.058	0.031	0	0.206
PFI	0.46	0.37	0.18	0.29	0.86	0.27

Source: Generated by the author using the *synth* command in Stata 17.

Table 4.3 displays the optimal weights of the individual control countries in the construction of the non-exchange countries’ synthetic comparisons. SCM places non-zero weights on most of the control countries, depending on the treated country. Only Nepal’s observations are not used in any of the synthetic controls. Bhutan and Malawi, for instance, contribute substantially to the construction of five out of six synthetics, with their weights ranging from 0.2 – 0.78 and 0.18 –

0.76 respectively. Romania and Cyprus, on the other hand, have non-zero weights only for one synthetic control each, likely indicating their difference in investment trend from the treated countries. Most of the synthetic controls are made up of about 29 percent of the donor pool, i.e., synthetic Burundi, synthetic DRC, and synthetic Liberia. Synthetic Guinea and synthetic Madagascar use around 43 percent of the pool. Whereas synthetic Ethiopia is generated as a weighted combination of about 71 percent of the donor countries considered. The wide range of control countries contributing to the synthetic controls provides reassurance that the estimated effects do not stem from utilizing a small subset of the donor pool variations.

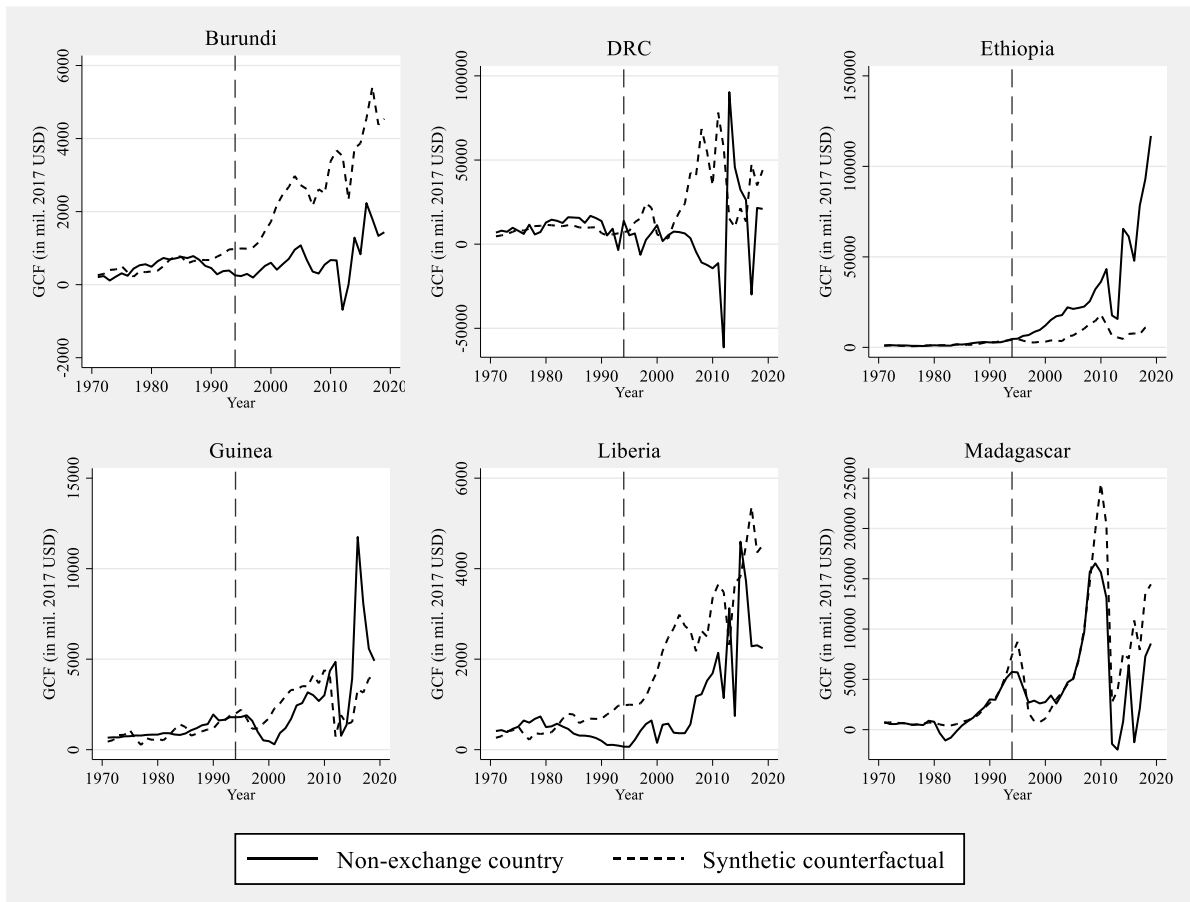


Fig. 4.3: GCF trends: Non-exchange countries vs. synthetic controls

Source: Generated by the author using the *synth* command in Stata 17.

Fig. 4.3 plots the evolution of GCF in the non-exchange countries compared to their synthetic counterparts. As before, the actual GCF trend in the treated countries between 1971 to 2019 is shown with solid lines. The dashed lines composed of a weighted set of donor countries are their synthetic controls and reflect the scenario of having stock exchanges. In most cases, the treated countries' pre-treatment capital formation patterns are well-replicated by their respective synthetic controls. Except for Liberia, the synthetic controls' GCF levels over the pre-treatment period were generally close to those of the treated countries. This suggests that the synthetic trajectories in the post-treatment period

provide a reasonable approximation to the trajectories that would have occurred if the non-exchange countries had exchanges in 1994.

Moreover, the PFIs provided in the last row of Table 4.3, largely confirm the visual assessment from Fig. 4.3. All six cases meet pre-treatment fit criteria, although the fit is weaker for some countries than for others. Ethiopia’s synthetic control at 0.18 achieves the best pre-treatment fit relative to the other five countries. However, Liberia’s synthetic control, with 0.86, has a substantially higher PFI than the other countries’ corresponding indices, which casts doubt on the significance of its estimated treatment effect.

Regarding the post-treatment period, Fig. 4.3 shows that the results diverge from country to country and depend on the post-treatment year considered. In the case of Burundi, it is clear that the country’s actual capital formation falls below the synthetic trajectory in every post-treatment year. This indicates that missing a stock market has negatively affected Burundi’s investment. As with GDP, Ethiopia’s GCF trajectory unequivocally outperforms its synthetic counterpart right after the treatment year. However, the ATT direction for the rest of the treated countries cannot be generalized from examining the graphs. Taking the case of DRC for example, while the solid line showing the actual GCF level stays below the synthetically constructed trajectory from 1994 to 2012, the former exceeds the latter between 2013 and 2016. Similar oscillation can be seen in the Guinea, Liberia, and Madagascar graphs.

Table 4.4 Effect of stock markets’ absence on investment

Countries without exchanges	Actual GCF	Synthetic Control GCF	ATT
Burundi	695.19	2,786.60	-75.05%
DRC	6,024.47	28,569.29	-78.91%
Ethiopia	32,772.22	7,313.76	348.09%
Guinea	2,954.88	2,688.76	9.90%
Liberia	1,311.19	2,777.44	-52.79%
Madagascar	5,535.58	8,057.01	-31.29%

Source: Generated by the author using the *synth* command in Stata 17.

Table 4.4 presents the average GCF (in millions of 2017 USD) of the non-exchange countries and the synthetic controls over the post-exchange period, and the ATTs. To compare the treatment effects across countries, the ATTs are converted into percentage terms. According to the table, between 1994 and 2019, the lack of stock markets in Burundi and DRC resulted in 75 and 79 percent GCF increments in these countries, respectively. Similarly, the actual GCF averaged 53 percent less in Liberia and 31 percent lower in Madagascar than what it would

have been in the counterfactual scenario. On the other hand, the analysis found positive ATTs for Ethiopia and Guinea, indicating higher investment with exchanges absence. Particularly, the estimate for Ethiopia suggests that, on average, its post-1994 actual capital formation exceeded its synthetic counterfactual by over three times, corroborating the visual evidence in Fig. 4.3.

Placebo tests

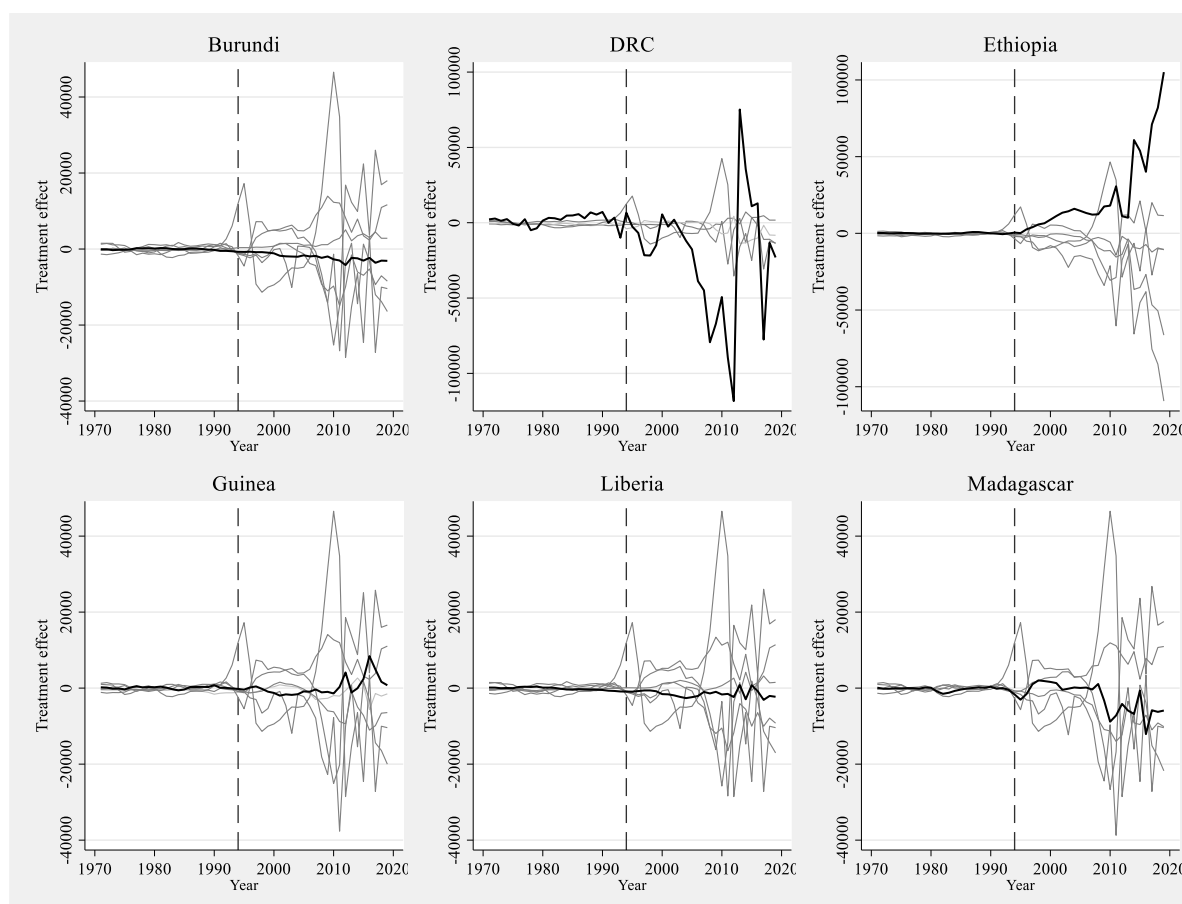


Fig. 4.4: Placebo distribution – GCF as outcome variable

Source: Generated by the author using the *synth* command in Stata 17.

To assess the significance of the results presented above further, placebo tests are conducted, in which pseudo-treatment effects are repeatedly estimated for each country in the donor pool as if it is the country that does not have an exchange while the remaining countries (including the real treatment country) serve as its control countries. The results from the experiments for each treated country are depicted in Fig. 4.4². Similar to the experiments conducted using economic output as an outcome variable, placebos with PFIs exceeding five times the treated countries being considered are excluded from the graphing. The treatment effects

²Despite Romani being within the pre-treatment fit index cutoff in two cases, DRC, and Liberia, it has an extremely positive placebo effect, and therefore, it is excluded from the graphs to avoid skewing the scale and obscuring the comparison with other control countries.

presented above appear not to be robust in four out of six countries. In particular, as the paths that show the effects lie toward the middle of the placebo distribution, the negative investment impacts of stock markets absence in Burundi, Liberia, and Madagascar or the positive impact on Guinea are not significantly different from zero. In contrast, in the case of Ethiopia, out of the six placebo estimations that achieve PFI values within the cutoff, five of them are constantly below the true treatment effect, and it is only between 2008 and 2013 that the sixth placebo effect surpassed Ethiopia's. Thus, this indicates a statistically significant difference between Ethiopia's synthetic and actual GCF. The placebo test for DRC also confirms a significant negative effect, as its estimated impact of missing a stock exchange falls below that of all the control countries with a reasonable PFI for over three-fifths of the post-treatment period.

4.3 Employment

Finally, the dissertation analyzes whether the absence of stock markets negatively impacted the employment rate of the countries without stock exchanges. It is often argued that stock markets boost job creation by facilitating investment and economic growth. To examine this empirically, the employment rates realized in the non-exchange countries are compared to the counterfactual scenario where these countries had stock exchanges. Data on employment rate for most countries in the study sample starts from 1980. Hence, while the post-treatment period still spans 1995 – 2019, the pre-treatment period used in the analysis is shortened to 1980 – 1993 due to this data limitation.

Table 4.5 Donor weights - Employment rate synthetic controls

Control countries	Treated countries					
	Burundi	DRC	Ethiopia	Guinea	Liberia	Madagascar
Bhutan	0	0.69	0	0.119	0.112	0
Botswana	0	0	0	0	0	0
Cyprus	0	0.126	0	0	0.442	0
Malawi	1	0	1	0.372	0	1
Nepal	0	0	0	0.09	0	0
Romania	0	0	0	0	0	0
Zambia	0	0.183	0	0.42	0.446	0
PFI		0.01		0.10		

Source: Generated by the author using the *synth* command in Stata 17.

Table 4.5 lists the contribution of the individual donor countries in the construction of synthetic controls corresponding to each country without a stock exchange. Unlike the previous two estimations using GDP and GCF as outcome variables, where every treated country's synthetic counterfactual is composed of

at least two control countries, the SCM algorithm assigns weight to just one donor country, Malawi, for generating the synthetic controls of Burundi, Ethiopia, and Madagascar. Unless Malawi's employment trajectory between 1980 to 1994 is similar to each of these countries, its extreme representation in their synthetic control is concerning. On the other hand, synthetic controls for DRC and Liberia are formed as weighted combinations of multiple countries: Bhutan, Cyprus, and Zambia. In contrast, Bhutan accounts for nearly 70 percent of synthetic DRC, Cyprus, and Zambia comprise almost 90 percent of synthetic Liberia. Guinea's counterfactual is the only synthetic control that uses more than half (four out of seven) of the donor countries.

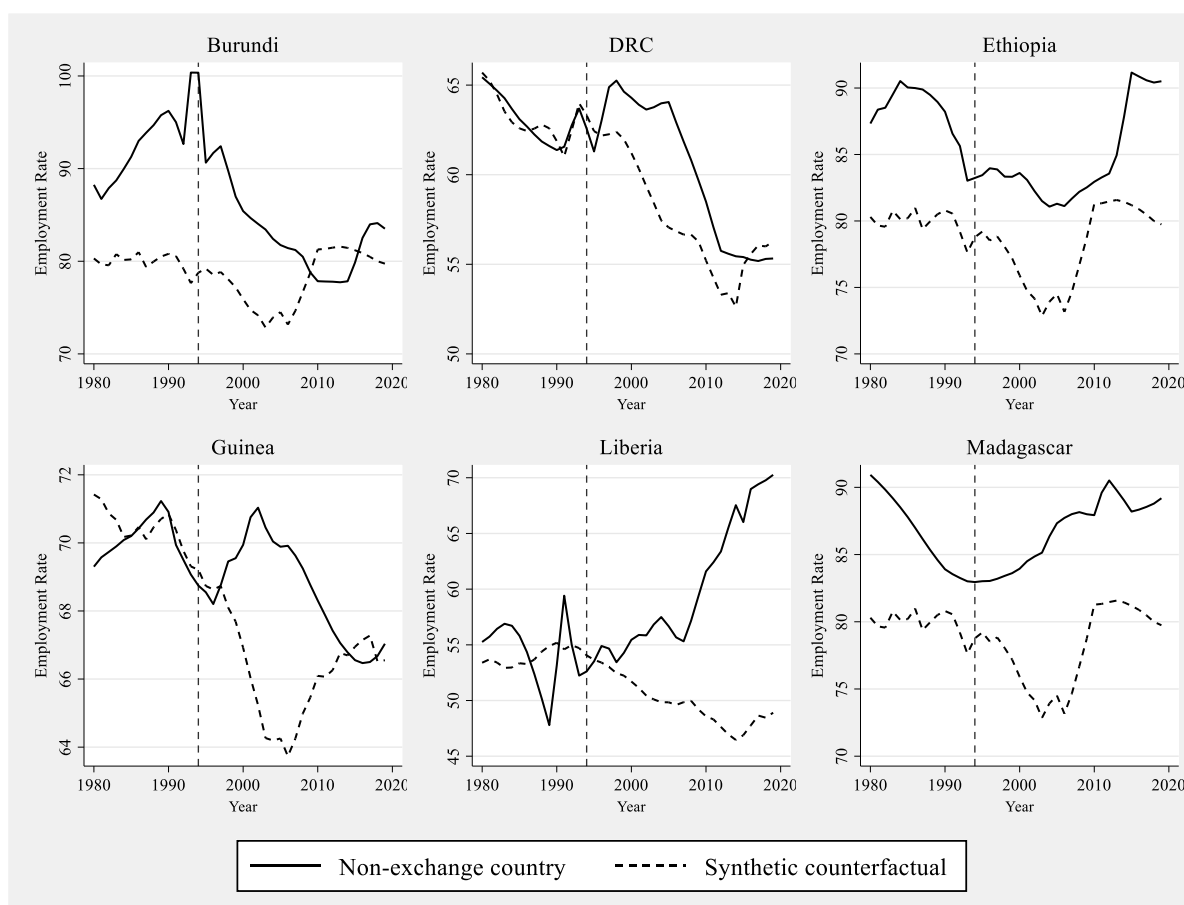


Fig. 4.5: Employment rate GDP trends: Non-exchange countries vs. synthetic controls

Source: Generated by the author using the *synth* command in Stata 17.

The evolutions of the non-exchange countries and their synthetic counterparts' employment rates over the pre- and post-treatment periods are illustrated in Fig. 4.5. Unfortunately, in most cases, the synthetic controls fail to replicate the pre-treatment employment rate trends of the corresponding non-exchange countries. In particular, the synthetic controls of Burundi, Ethiopia, and Madagascar do not deviate significantly from the actual trends throughout the entire pre-treatment period. This indicates that the weighted average of the available control countries does not adequately approximate the employment patterns of these treated countries. Although the synthetic control for Liberia crosses paths with the actual

trend at a few data points, it still portrays a poor pre-treatment match overall. DRC's and Guinea's synthetic counterfactuals are the only ones that provided a satisfactory pre-treatment fit. The examination of these graphs in the post-treatment period suggests that these countries have not missed out on employment benefits due to the absence of stock markets. Rather, their employment rates in post-treatment years appear to be higher than the counterfactual scenario where they established exchanges in their respective economy in 1994.

Table 4.6 presents DRC's and Guinea's employment rate and their synthetic controls in the post-treatment period. It also calculates the ATTs of lacking a stock market in these countries. As the SCM cannot construct a reasonable synthetic control for the other four countries, as shown above, the results that can be drawn from them would be less reliable. Therefore, the dissertation disregards them in the remainder of this analysis. The average effects on DRC and Guinea due to the absence of stock markets are calculated at a positive of 4.7 and 3.46 percent.

Table 4.6 Effect of stock markets' absence on employment rate

Countries without exchanges	Actual	Synthetic Control	ATT
DRC	60.27	57.57	4.70%
Guinea	68.60	66.30	3.46%

Source: Generated by the author using the *synth* command in Stata 17.

Placebo tests

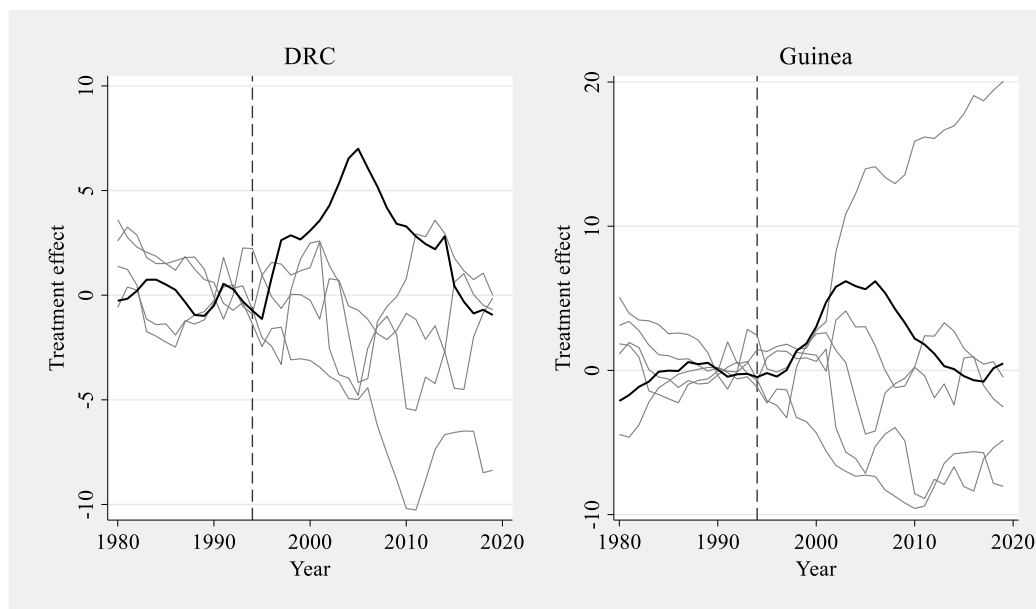


Fig. 4.6: Placebo distribution - Employment as outcome variable

Source: Generated by the author using the *synth* command in Stata 17.

Regarding the significance of these results, Fig. 4.6 relays the placebo tests assessing the validity of the estimated employment impacts for DRC and Guinea. As before, the graphing only displays placebo runs that have PFIs less than five times those of the treated countries. For DRC, the line showing the treatment its treatment effect remains above all of the placebo lines for most of the post-1994 period, supporting a robust result. Similarly, Guinea’s effect line exceeds four of the five placebo lines, with the one above having a worse pre-treatment fit. Overall, the figure demonstrates that the positive employment effects from lacking stock markets are larger than placebo impacts for both countries, providing confidence that the results are not due to chance.

4.4 Further robustness checks

In order to examine the estimated treatment effects above hold under an alternative weight assignment strategy, the dissertation applies a recent variant of the SCM called synthetic control with lasso regularization (SCUL), developed by Hollingsworth and Wing (2020), as a robustness check. The main difference between SCM and SCUL is the latter relaxes the constraints that require the weights to be nonnegative and sum up to one instead uses lasso regression to ensure sparsity in the weights.

Table 4.7 Effect of stock markets’ absence, SCUL

Countries without exchanges	GDP	GCF	Employment rate
Burundi	-45.19%	-81.53%	—
Dem. Rep. Congo	-3.02%	-90.60%	11.60%
Ethiopia	6.98%	683.83%	—
Guinea	-42.58%	-32.39%	3.23%
Liberia	203.79%	184.99%	—
Madagascar	8.96%	-31.84%	—

Source: Generated by the author using the *synth* command in Stata 17.

Table 4.7 presents the ATT percentage values estimated for each non-exchange country based on SCUL. Albeit different in magnitude, the results affirm the baseline analysis findings of adverse effects on Burundi, DRC, and Guinea’s GDP. For Ethiopia, while the ATT estimated through SCUL is considerably smaller, the positive sign corroborates the main finding. In contrast, the SCUL treatment effect estimations for Liberia and Madagascar fail to confirm the baseline findings. Considering the results for investment, the SCUL’s ATT estimates indicate the negative impacts of a stock market’s absence in Burundi, DRC, Guinea, and Madagascar’s GCF. Despite the estimated ATT through SCUL being almost twice as large as the initial estimate, the contrasting positive effect

on Ethiopia’s GCF reported by the baseline analyses also remains unaltered. The exception is the case of Liberia, where the SCUL results indicate a benefit from having no stock market. Furthermore, while the newly estimated ATT magnitude for DRC is over twice as large as the standard SCM estimates, and the effect sizes for Guinea are nearly identical across both weighting approaches, the SCUL estimates affirmed the positive labor market impact found in the baseline analyses.

4.5 Discussion

The analyses in the preceding sections suggest that the economic impact of a stock market’s absence diverges across countries and macroeconomic indicators. This section discusses these findings.

Table 4.8 Effect of stock markets’ absence, SCM

Countries without exchanges	GDP	GCF	Employment rate
Burundi	-	NE	
DRC	-	-	+
Ethiopia	+	+	
Guinea	-	NE	+
Liberia	-	NE	
Madagascar	-	NE	

Note: *NE* stands for ‘no effect’ indicating the estimated effect is statistically insignificant.

Source: Generated by the author using the *synth* command in Stata 17.

The results show that most non-exchange countries have forgone considerable economic output gain due to the lack of stock markets. The real GDPs of Burundi, DRC, Guinea, Liberia, and Madagascar are less than what they would have been had they created exchanges. This aligns with the extensive literature demonstrating the economic growth benefits of stock markets. Through efficient capital allocation, liquidity provision, risk diversification, and corporate governance improvements, well-functioning stock markets would have boosted the production of goods and services in these countries (Levine, 2005). Conversely, Ethiopia appears to be better off for not having a stock exchange. The absence of a stock market seems to have increased the country’s economic output. While unexpected, this result reinforces arguments made by some researchers against unconditionally promoting stock markets in developing countries.

Examining investment impacts reveals that Ethiopia again stands out as the only country in the sample that has benefited from lacking an exchange. The country displays better investment performance relative to the counterfactual

scenario of having an exchange. In DRC investment performance was worse relative to the counterfactual scenario of having an exchange. In the remaining four countries examined, not having a stock exchange shows a negligible impact on investment. According to the SCM estimates, their capital formation trajectories do not significantly diverge from the counterfactual synthetic controls. It has been argued that the short-termism and speculative nature of capital movements in stock markets do not improve long-term physical investments (Singh, 2008). Similar findings by Sarkar (2007), Ayadi and Williams (2023), and others suggest stock markets' impact on investment rates is limited, particularly in developing countries.

The findings for aggregate employment tell an interesting story. Both DRC and Guinea display higher employment rates without stock exchanges than they would have if stock exchanges had been present. Even though SCM was unable to find suitable synthetic controls from the available donor pool for the majority of the non-exchange countries considered, the impact on the two countries for which the method can construct fairly fitting counterfactuals is favorable.

Overall, while these findings are enlightening by their own accord, they raise some questions as well. Why do stock market absences have heterogeneous impacts on output, investment, and employment? Why are most non-exchange countries found to be forfeiting in terms of GDP gains yet remaining unaffected in terms of investment, or even benefiting in terms of employment as a result of lacking stock markets? Moreover, what peculiar feature does Ethiopia possess that makes the unavailability of an exchange advantageous?

The conventional wisdom regarding the interaction between stock markets, capital formation, and labor markets suggests that by mobilizing savings and efficiently allocating capital, stock markets boost investment, thereby facilitating job creation. However, this well-theorized interaction occasionally may fail to materialize for a variety of reasons.

First, short-termism may offset any potential positive effects stock markets have on investment. Capital formation involves long-term investments in the creation of means of production. The time horizon of such processes typically extends far beyond that of the activities observed in stock market environments. In recent decades, stock exchanges have seen a surge in short-term investors who focus on immediate rewards over long-term gains. For instance, a Reuters analysis based on New York Stock Exchange data finds that as of 2020, the average holding period of U.S. shares is just 5.5 months (Chatterjee and Adinarayan, 2020). This is usually not enough time for long-term investments to start making a profit. Therefore, firms may reduce spending on long-term projects to boost the current stock price and appease investors.

Another contributing factor to the lack of significant investment loss due to a stock market's absence could be inefficiency in stock markets. Grossman and

Stiglitz (1980) show that because the production of information requires incentives to compensate for its cost, stock markets, cannot be perfectly efficient by their very nature. Thus, stock prices do not fully incorporate all available information relating to an asset. Furthermore, the resulting mispricing causes inefficiency in the core function of stock markets: capital allocation. Overvalued yet inefficient investments get financed, whereas undervalued but efficient investments remain underfunded, which distorts investment decisions. This ultimately dampens aggregate capital formation.

Volatility provides another potential explanation for the stock market's limited impact on investment. The recently developed inelastic market hypothesis states that as institutional investors, who account for a large portion of trading activity in stock markets, have mandates to maintain a certain number of shares, they show little response to price movements (Gabaix and Koijen, 2021). This leads to the aggregate stock demand being inelastic, where demand shocks and capital flows have outsized price effects. Hence, any fluctuation in flows, for any reason, can lead to amplified price changes, leading to a volatile market. High market volatility, however, can have adverse implications on real economic activities, like capital formation. If stock prices are too volatile, investors may be less eager to hold equities, and their compensation requirement for bearing systematic risk may increase, both of which, in turn, constrain investment. Moreover, higher uncertainty makes firms delay irreversible investment decisions to maximize their project's value (Hu, 1995). Therefore, these effects may counter the hypothesized benefits of capital formation.

Given the lack of evidence that stock markets would have stimulated investment in DRC and Guinea, the positive effects of the absence of exchanges on employment rates do not come as a surprise. In addition to the absence of significant investment impact that can translate to job creation, the stock markets' sectoral reallocation function provides a potential rationale for the favorable employment findings. According to the sectoral shifts hypothesis of unemployment originally postulated by Lilien (1982), unemployment, is partly the result of resources being reallocated from one sector to another in the economy. Given that not all sectors grow at the same pace, the labor demand in the relatively fast-growing industries will be higher and in the declining industries lower, necessitating labor reallocation. However, workers cannot simply reallocate across sectors since each industry requires certain industry-specific skills. Applying this theory to the subject at hand, efficient stock markets, through share prices, direct capital to growing sectors, while starving declining ones. Naturally, this disproportion in capital allocation will be followed by a change in demand for inputs like labor across the sectors. This inevitably exacerbates the structural unemployment rate, although capital is being allocated to its most efficient use.

Suppose the effect of not having a stock market is negligible on investment and positive on employment. Then, what is the driving factor of the estimated significant negative effect on the output of the non-exchange countries? Acknowledging that this is a conundrum that requires further examination, there could be some plausible explanations, one of which is the improvement of total factor productivity (TFP). As finance-growth literature highlights, a well-functioning stock market can boost TFP through efficient resource allocation, risk-sharing, and corporate governance improvements (Bennett et al., 2020, Moshirian et al., 2021). Without stock exchanges, financial constraints may hinder firms from investing in productivity-enhancing activities like research and development, innovations, and technology adoption. Besides, given that innovations are risky and entail a high degree of uncertainty, investors and firms may hesitate to undertake such projects without the means to diversify the risk. Moreover, compared to publicly traded firms, family or state-owned firms prevalent without stock markets tend to have weaker governance mechanisms. In the latter, transparency and accountability are limited. There is no external shareholder oversight or takeover threats. This allows incompetent and opportunistic managers to undertake productivity-diminishing projects. These firm-level productivity deficiencies impede the enhancement of TFP at an aggregate level, thereby decreasing the overall economic output. Therefore, although the absence of stock markets did not appear to result in labor and capital losses in non-exchange countries, the estimated negative effect on output could be driven by the loss of TFP improvement.

Finally, one possible explanation for Ethiopia's unique benefits from lacking a stock exchange could be its high dependency on the banking sector. According to the IMF's Financial Development Index data, Ethiopia's financial institution development had been significantly higher than the other non-exchange countries. For instance, during the post-treatment period (from 1994 – 2019), Ethiopia's average financial institution development index, which is an aggregate of depth, access, and efficiency of banks, microfinance, insurance companies, etc., was nearly twice that of the other five non-exchange countries. Whether credit and equity markets substitute or complement each other is a highly contested issue in the finance literature. Ample empirical evidence suggests that banks' contribution to economic growth, particularly in developing countries, is far greater than stock markets' (Arestis et al., 2001, Seetanah et al., 2012, Kim and Lin, 2013, Rioja and Valev, 2014). Therefore, establishing an exchange in Ethiopia's already bank-dominated system may be futile and even undermine growth by shifting funds away from the pivotal banking sector.

5. CONCLUSION AND IMPLICATIONS

5.1 Summary

The main purpose of this thesis was to investigate the macroeconomic consequences of not having stock markets in non-exchange countries in terms of economic output, investment, and employment. A data-driven econometric technique called the synthetic control method (SCM) is employed to estimate the counterfactual macroeconomic conditions that would have materialized in selected countries had they established stock exchanges. SCM creates a synthetic comparator by taking observed covariates and pre-intervention outcomes of the control countries with exchanges. The analyses examined the impacts on six countries without stock markets: Burundi, DRC, Ethiopia, Guinea, Liberia, and Madagascar. Comparable countries that formed their first stock exchange around 1994 were selected for the donor pool. Furthermore, placebo tests assessed the statistical significance of the estimated treatment effects.

The results reveal that most non-exchange countries forfeited substantial output gains due to lacking stock markets. For countries such as DRC, Guinea, and Liberia the difference between the synthetic controls and the actual output is striking, with GDP over 50 percentage points lower in reality than in the counterfactuals. Similar sizable output losses emerged for Burundi and Madagascar. In sharp contrast, Ethiopia experienced a robust, as the placebo test demonstrated, large positive GDP gain as a result of a stock market absence. On the other hand, there does not seem to be strong evidence to back-up the claim that the lack of stock markets unfavorably affected the overall investment for most of the countries considered. While the SCM indicates a negative effect on four out of the six non-exchange countries, the impacts on Burundi, Liberia, and Madagascar GCF fall short of robustness according to the result from the placebo tests. The exception is DRC's case where the estimated adverse effect remained significant for three-fifths of the post-exchange years. Ethiopia again exhibits a counterintuitive over three-fold higher capital formation without a stock. This positive effect is backed by the placebo test results as well. Insufficient pre-treatment synthetic control fits impeded the analyses on employment impact for most countries. However the two successes, DRC and Guinea show higher employment rates relative to their counterfactuals in the years following the establishment of exchanges in the control countries.

5.2 Implications and Contributions

Taken together, the results summarized above point to the following tentative policy implications. First, given the substantial forgone output gains estimated for most non-exchange countries, national policy makers in these countries may want to prioritize the establishment of stock markets to take advantage of its economic benefits. Second, the apparent negligible investment impact on four out of six

countries without a stock exchange implies it is crucial to accompany the formation of exchanges with effective financial regulations that address short-termism and encourage the allocation of capital to productive uses. Third, the employment gains in some countries highlight that stock markets can lead to reallocation frictions that exacerbate structural unemployment. It is therefore important to ensure the development of a stock market is supplemented by policies that facilitate labor mobility and programs that promote training to improve workers' skills. Fourth, the estimated beneficial effect of a stock market absence in Ethiopia sheds some doubt on the importance of creating an exchange in the country. Especially in the face of the government's ongoing efforts to launch the Ethiopian Securities Exchange (ESX) by the end of 2024, the findings of the current study warrant the need for careful evaluation of the potential cost and merits associated with stock markets. And if its establishment is certain, it would be wise for policy makers to design and implement sound regulations, supervision, and enforcement activities so as to reduce the negative aspects of the perspective market. Taken as a whole, however, the heterogeneous impacts underline how inappropriate a one-size-fits-all policy prescription of stock market promotion in developing countries is. Such policy directions need to be guided by individual country characteristics and needs.

The current dissertation makes several distinct contributions to the literature. First, most studies on the stock markets-growth nexus are conducted based on what is observed in the countries that already have the market. However, this study departs from previous works by investigating the issue from the perspective of countries without stock exchanges. The multi-indicator approach that encompasses output, investment, and employment also enables a comprehensive assessment of the stock markets' growth impact. Second, this study is the first to apply the SCM to the evaluation of economic consequences of stock market inaccessibility. Hence, by employing a transparent data-driven approach for constructing synthetic counterfactuals, it improves over traditional case studies and cross-country regression approaches. It can also be used as a methodological reference for subsequent research on the usage of SCM for analyzing stock market impact evaluations. Finally, beyond evaluating stock markets absence outcomes, the dissertation makes the case for using SCM for estimating, not only the impact of interventions but also their absence, which has not been a typical use of the method but could be of great importance. In this regard, it can serve as a demonstration of SCM implementation for evaluating the consequences of inaction for estimating missed opportunities or mitigated losses.

5.3 Limitations and Future Research

While the dissertation advances the evaluation of the impact of stock markets on many fronts, it is not without its limitations. First and foremost, it should be noted that this dissertation is not meant to be a comprehensive evaluation of the relationship between specific attributes of stock markets and economic growth.

Instead, it solely focuses on the impact of the mere presence of the establishment itself. While it is outside the scope of the current dissertation, the impacts of stock markets may diverge based on their level of development and functionality. Second, it does not claim to estimate all the ways the presence of stock markets may impact nations' economies. While it sheds some light on the implication of its absence on non-exchange countries' output, investment, and employment, there could be other ways through which the lack of a stock market may impact these countries. Another limitation of the study is that due to data limitations, the SCM analysis relies on only seven control countries for constructing the synthetic counterfactuals. Notwithstanding the approach can provide substantial improvement relative to the alternative traditional methods and there are no definitive guidelines on the ideal number of units in a donor pool, having more potential donor units increases the likelihood of producing a synthetic control with a good pre-intervention fit. Finally, it is important to bear in mind that although the robustness checks conducted affirm the direction of the estimated impacts on the non-exchange countries, they indicate these impacts' precise magnitudes are uncertain. This demands exercising some caution in interpreting the findings.

Nevertheless, while having these shortcomings, this dissertation hopefully provides a valuable new perspective for research on the relationship between stock markets and economic growth. It is also hoped that this modest starting point can be indicative of several fruitful avenues for further research. The most obvious would be a future replication of the study to concretely establish the exact quantity of losses or benefits in the non-exchange countries. In this regard, using other larger control countries and performing various sensitivity analyses would be beneficial for drawing more solid conclusions. The other plausible conjecture is exploring the impacts while taking into account the nature or characteristics of an exchange that would exist in the counterfactual scenario. While SCM is valuable for creating a synthetic control country with an exchange and estimating the impacts of lacking stock markets, it does not give detailed insights into the size, liquidity, or other features of the stock exchange a country would have in the counterfactual scenario given data on a set of determinant variables. Therefore, although this endeavor might involve a different method of analysis, the contribution would be more informative. It would also be worthwhile to examine the forfeited benefits or the mitigated losses across other indicators of economic well-being like income inequality, consumption, etc.

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APPENDICES

Table A1 Predictor means in the pre-treatment period

	Guinea		Liberia		Madagascar	
GDP	Actual	Synthetic	Actual	Synthetic	Actual	Synthetic
Inflation	0.07	0.08	0.06	0.01	0.08	0.12
Pop. growth	2.22	2.70	1.58	2.73	2.87	3.00
Democracy	0.08	0.12	0.14	0.12	0.14	0.13
FID	0.07	0.13	0.08	0.18	0.12	0.13
GDP (1975)	14838.79	14308.88	3396.66	3420.64	12228.01	11913.59
GDP (1980)	16913.24	17178.84	3933.48	2991.88	13481.37	13314.36
GDP (1985)	18225.02	22198.25	3225.95	4389.42	15040.88	17592.62
GDP (1990)	21955.06	23889.75	1882.58	3888.09	16515.25	16793.09
GDP (1993)	23885.17	24370.94	739.51	3665.94	15298.80	16036.73
GCF	Actual	Synthetic	Actual	Synthetic	Actual	Synthetic
Inflation	0.11	0.08	0.08	0.01	0.09	0.06
Pop. growth	2.23	2.96	1.53	2.72	2.89	3.06
Democracy	0.08	0.10	0.14	0.10	0.14	0.27
FID	0.07	0.14	0.08	0.18	0.12	0.19
GCF (1975)	741.94	1098.31	510.53	524.96	609.59	671.69
GCF (1980)	829.01	591.64	501.55	365.80	797.99	687.98
GCF (1985)	891.33	1258.21	345.27	783.74	411.96	782.60
GCF (1990)	1969.16	1177.02	186.31	687.87	3040.40	2682.77
GCF (1993)	1814.08	1908.72	78.94	979.54	5153.35	5592.71
Employment Rate			Actual	Synthetic		
Inflation			-0.05	0.26		
Pop. growth			3.00	3.21		
Democracy			0.09	0.16		
FID			0.01	0.13		
Emprt(1985)			34.28	33.88		
Emprt(1990)			33.50	33.82		
Emprt(1992)			33.71	33.58		
	Burundi		DRC		Ethiopia	
GDP	Actual	Synthetic	Actual	Synthetic	Actual	Synthetic
Inflation	0.04	0.01	0.02	0.10	0.07	0.06
Pop. growth	2.23	2.61	2.92	2.41	2.73	2.25
Democracy	0.11	0.12	0.09	0.13	0.06	0.18
FID	0.07	0.19	0.01	0.14	0.25	0.19
GDP (1975)	3038.63	3149.58	52089.10	36630.49	21929.40	20932.81
GDP (1980)	4060.75	3971.84	57589.83	51747.69	25596.28	26600.69
GDP (1985)	4796.42	5331.93	64053.46	61690.02	39068.02	33083.77

GDP (1990)	5522.09	5480.76	51503.09	64203.54	39344.02	35664.44
GDP (1993)	5312.86	5480.75	42911.04	57953.34	35477.49	34532.94
GCF	Actual	Synthetic	Actual	Synthetic	Actual	Synthetic
Inflation	0.06	0.00	0.01	0.12	0.09	0.07
Pop. growth	2.25	2.71	2.92	2.58	2.77	2.72
Democracy	0.11	0.10	0.09	0.12	0.06	0.33
FID	0.07	0.18	0.01	0.13	0.25	0.24
GCF (1975)	310.94	512.98	7995.89	8646.56	1053.18	812.99
GCF (1980)	488.30	361.50	12895.39	11327.28	1169.64	1207.59
GCF (1985)	764.28	772.99	15892.79	10821.64	1555.42	1567.07
GCF (1990)	452.51	680.97	13607.79	6423.72	2760.57	2726.30
GCF (1993)	383.68	972.05	-3676.85	6360.61	3628.18	3680.22
Employment Rate			Actual	Synthetic		
Inflation			-0.05	0.26		
Pop. growth			3.00	3.21		
Democracy			0.09	0.16		
FID			0.01	0.13		
Emprt(1985)			34.28	33.88		
Emprt(1990)			33.50	33.82		
Emprt(1992)			33.71	33.58		

Source: Generated by the author using the *synth* command in Stata 17.

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Etsub Tekola Jemberu, Ph.D.

Forfeited Benefits or Mitigated Losses? The Economic Impact of Not Having a Stock Market: A Synthetic Control Approach

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