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Tomas Bata University in Zlín
Faculty of Management and Economics

Doctoral Thesis Summary

The Impact of Uncertainty on The Labour Market in Egypt

Důsledky nejistoty na trh práce v Egyptě

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ABSTRACT

The current economic overview has become extremely uncertain. Uncertainty about how individuals and firms react to the future evolution of the economy is considered one of the most critical phenomena facing policymakers in developed and developing countries. It appears after significant shocks such as revolutions, natural disasters, terror attacks, elections, and economic crises. Since the financial crisis of 2008, the Egyptian economy has faced many unanticipated adverse shocks due to political, security, and economic instability on the one hand and the government's decisions to re-stabilize the economy on the other hand. These incidents have forced households and companies to become more "uncertain" about the current and future economic conditions. Moreover, the current high uncertainty about the financial and health situation due to the COVID-19 pandemic encourages researchers to investigate its implications on the global economy and the Labour market. It has been argued that the implications of uncertainty shocks seem to be stronger in developing than the developed countries. The main objective of this doctoral thesis is to investigate the impact of uncertainty shocks, measured by the volatility of the Egyptian stock market index, EGX30, on the labour market in Egypt. The author employed quarterly time series data from 2003Q4 to 2021Q2. The vector autoregressive model (VAR), the impulse function (IRF) tool, and the Granger causality test have been used to capture the effect of uncertainty shocks on the weekly average wage, labour productivity, and unemployment rate. The results showed that uncertainty shocks, measured by the stock market index, EGX30, cause a sharp drop in employment, GDP, and labour productivity growth in the short-run. At the same time, it increases weakly average wages, consumer price index, and interest rate. It happens because uncertainty forces firms to pause or postpone their hiring and investment decisions, decreasing labour productivity by mismatching skills to jobs. Thus, uncertainty shocks generate temporary sharp recessions and then recoveries. Nevertheless, since the confidence intervals contain zero, the results of impulse response functions are statistically insignificant.

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ABSTRAKT

Nejistota ohledně toho, jak jednotlivci a firmy reagují na budoucí vývoj ekonomiky, je považována za jeden z nejkritičtějších jevů, kterým čelí zákonodárci ve vyspělých a rozvojových zemích. Objevuje se po významných otřesech, jako jsou revoluce, přírodní katastrofy, teroristické útoky, volby a hospodářské krize. Od finanční krize v roce 2008 čelila egyptská ekonomika mnoha neočekávaným nepříznivým otřesům v důsledku politické, bezpečnostní a ekonomické nestability na jedné straně a vládních rozhodnutí znovu stabilizovat ekonomiku na straně druhé. Tyto incidenty donutily domácnosti a firmy, aby se staly více „nejisté" ohledně současných a budoucích ekonomických podmínek. Kromě toho současná vysoká nejistota ohledně finanční a zdravotní situace v důsledku pandemie COVID-19 povzbuzuje výzkumníky, aby zkoumali její důsledky na globální ekonomiku a trh práce. Tvrdilo se, že důsledky šoků nejistoty se zdají být silnější v rozvojových než rozvinutých zemích. Hlavním cílem této disertační práce je prozkoumat dopad šoků nejistoty měřených volatilitou indexu egyptského akciového trhu EGX30 na trh práce v Egyptě. Autor použil čtvrtletní data časových řad od 4. čtvrtletí 2003 do 2. čtvrtletí 2021. K zachycení vlivu šoků nejistoty na týdenní průměrnou mzdu, produktivitu práce a míru nezaměstnanosti byl použit vektorový autoregresní model (VAR), nástroj impulsní funkce (IRF) a Grangerův test kauzality. Výsledky ukázaly, že šoky nejistoty, měřené akciovým indexem EGX30, způsobují v krátkodobém horizontu prudký pokles zaměstnanosti, HDP a růstu produktivity práce. Zároveň zvyšuje týdenní průměrné mzdy, index spotřebitelských cen a úrokovou sazbu. Stává se to proto, že nejistota nutí firmy pozastavit nebo odložit svá rozhodnutí o náboru a investicích, což snižuje produktivitu práce přiřazováním pracovních míst zaměstnanců s nevhodnými dovednostmi. Šoky nejistoty tedy generují dočasné prudké recese a poté oživení. Nicméně, protože intervaly spolehlivosti obsahují nulu, výsledky funkcí impulsní odezvy jsou statisticky nevýznamné.

1. INTRODUCTION

The current COVID-19 pandemic has generated discussions about how uncertainty shocks led to severe drops in the global economy. According to Altig et al. (2020), almost every side of this crisis is surrounded by uncertainty. The pandemic has an immediate impact on the economy and policy responses on the economic aspect. It generated uncertainty about the speed of recovery and the period during which the changes in spending, travelling, and the working pattern will persist (e.g. Cavallo and Forman, 2020; Barrero et al., 2020; Dockery and Bawa,2020). On the epidemiological aspect, uncertainties include the infectiousness of the virus, the effectiveness of vaccines against the new variants, and the effectiveness of measures that countries took to fight against the virus (e.g. Fauci et al. 2020, Abouk and Heydari, 2021; Ndwandwe and Wiysonge, 2021). However, the effects of the pandemic vary between the countries, according to the economic conditions of each country and the ability of its system to resist consequences, as well as the speed of the recovery. The high uncertainty due to the pandemic shock has found its way to Egypt as in the whole world. According to Breisinger et al. (2020), for each month that the pandemic continues, the GDP of Egypt decreases by about 7-8 %, while the average household consumption is expected to decline between 9 and 10.6 %.

According to Castelnuovo et al. (2017), uncertainty could be either an endogenous reaction to other shocks or an exogenous operator of the business cycle or an endogenous response to fluctuations or an exogenous source for business cycle variation. Macroeconomics and microeconomic uncertainty arise in the recession and fall in booms, income and wages volatility seem countercyclical. Moreover, uncertainty seems to be higher in developing countries than in developed countries because they have the most volatile GDP growth rates, exchange rates, and stock markets (Bloom, 2014). Higher uncertainty induces firms to suspend their hiring and investment decisions, decreasing productivity growth in the short term. Simultaneously, it generates an overshot in labour, productivity, and output in the medium term (Bloom,2009). High uncertainty causes a deep recession and sluggish recovery accompanied by persistent unemployment (Williams, 2013).

Uncertainty, defined as the absence of information about the future, has become a buzzword in the academic arena over the past three decades due to the development of knowledge-driven and e-business enterprises (Song, 2013). Milliken (1981) considers uncertainty "an individual's perceived inability to predict something accurately". Many managerial studies consider uncertainty the main factor in explaining other management concepts such as organizational behaviour, strategic management, project management, and organizational learning (e.g. Karlsen, 2011; Song, 2013).

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Furthermore, there is a research gap in previous studies as follows:

1. Earlier studies focused mainly on the impact of uncertainty on investment, while most recent studies focused on the impact of uncertainty shocks on the economy. And thus, they have not given much attention to the impact of uncertainty shocks on the labour market, especially unemployment, labour productivity, and wages.

2. Most previous studies concentrated on investigating the impact of uncertainty shocks in developed countries. According to Myint (1971), the generalizations of economic theory are based on the specific conditions of the developed countries, and therefore they are not valid for developing countries. Moreover, according to Bloom (2014), uncertainty seems to be higher in developing countries than the developed countries because they have the most unstable GDP growth rates, exchange rates, and stock markets.

3. The current high uncertainty because of the COVID-19 crisis encourages researchers to examine its effects on the labour market, especially in developing countries. Due to low health care capacity, poor governance, low fiscal space, shallow financial markets, and large informal sectors, the catastrophic consequences of the crisis on the developing countries are expected to be higher than the developed countries (Loayza and Pennings, 2020).

4. Since there is a difference in economic conditions and labour market structure between developed and developing countries, it creates space for researchers to carry out a thorough investigation of this phenomenon in developing countries such as Egypt. Furthermore, the characteristic of the Egyptian economy is quite different from the characteristics of developed countries.

This doctoral thesis aims to fill this gap by examining the impact of uncertainty shocks, measured by the stock market volatility, on the labour market in Egypt. The author employed quarterly time series data from 2003Q4 to 2021Q2. The vector autoregressive model (VAR) and the impulse function (IRF) tool were used to capture the effect of uncertainty shocks on the weekly average wage, labour productivity, and unemployment rate. The EViews 12 University Edition software has been used for data analysis. The data has been collected from Egypt's central bank (CBE), World Bank, International Monetary fund (IMF), Ministry of Manpower and Immigration, Central Agency for Public Mobilization and Statistics (CAPMAS), and Egypt State Information Service.

The remainder of the doctoral thesis summary will be divided as follows: Chapter two discusses the theoretical framework of the thesis by explaining uncertainty, the chancels through which it can affect the labour market, and a macroeconomic overview of the Egyptian economy and labour market. In

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addition, it includes a review of the previous literature, methods used, and the research gap. Chapter three presents the research problem, objectives, and questions of the thesis. Chapter four exhibits the methodology, data, and research methods used in the thesis. Chapter five shows the data analysis and the main results of the statistical model. Chapter six includes a discussion of the research results. Chapter seven provides the conclusion of the thesis. Chapter eight indicates the theoretical and empirical contributions of the thesis, limitations, and future research directions.

2. THEORETICAL OVERVIEW AND LITERATURE REVIEW

2.1 Theoretical overview

2.1.1 Understanding uncertainty

Knight (1921) introduced the concept of uncertainty as an imbalance in the business environment that managers encounter. In management literature, many studies attempted to introduce a definition of uncertainty. It is a feature of all possible insinuations associated to the future (Garner, 1962). The uncertainty which managers face can be segregated into three categories; the first category is related to the lack of understanding as to how the business environment is changing, the second category is related to the absence of ability to predict the future, the third category is related to the lack of knowledge about the future (Ellis and Shpielberg, 2003).

Davidson (1999) distinguishes between two concepts of uncertainty: classical and Keynesian. The classical theory assumes a world of perfect certainty where households and firms have complete knowledge about the external economic environment (Ricardo, 1891). On the other hand, Keynes defines uncertainty as a phenomenon whose probability cannot be calculated, leaving people without any knowledge about the future (e.g. Ferrari-Filho and Camargo Conceição, 2005; Erkuş and Terhorst, 2021). The neoclassical theory of rational expectations defines uncertainty as to when individuals make their decisions based on their subjective probability distribution (Lucas, 1972).

The importance of studying uncertainty comes from the fact that the competition in the current business environment depends mainly on being aware of uncertain changes and how to manage such changes (e.g. Raz and Hillson, 2005; Scoones, 2019; Reis et al., 2020; Poli, 2022). It affects organizational members and organizational choices (e.g. Song, 2013; Townsend et al., 2018). Moreover, it helps us understand the instability of contemporary economies and the relevance of the role of institutions in coordinating them (Ferrari-Filho and Camargo Conceição, 2005). Exploring uncertainty and understanding how to deal with it helps organizations make good decisions and expect good results from these decisions (Mousa and Alas, 2016). Harrison and Kelly (2010) indicate that an organization's external environment is the only origin of uncertainty. On the

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contrary, Sinding et al. (1998) affirm that the source of uncertainty is the external environment of an organization and the internal environment. The financial capability, information processing, and organization values can cause ambiguity and uncertainty (e.g. Foerstl et al., 2018; Van Rijmenam et al., 2019; McGuigan, 2021)

As it is impossible to anticipate what will happen in the future, both households and firms use their judgment to decide consumption and investment based on their expectations about what will happen in the future. Also, policymakers make their decisions depending on their predictions. Therefore, uncertainty arises since the probability of these expectations is unknowable or impossible to measure accurately (Knight, 1921). Furthermore, uncertainty arises after big economic, financial, social, and political shocks such as elections, financial crises, terror attacks, and revolutions. Ahir et al. (2019) computed the world uncertainty index from 1996- 2019. As shown in figure1, the uncertainty index increased significantly after the shocks caused by significant global incidents such as the Gulf War, 9/11 attacks, the 2012 SARS outbreak, the Eurozone debt crisis, and the 2015 migration debt crisis, the 2016 US elections, and the Brexit.
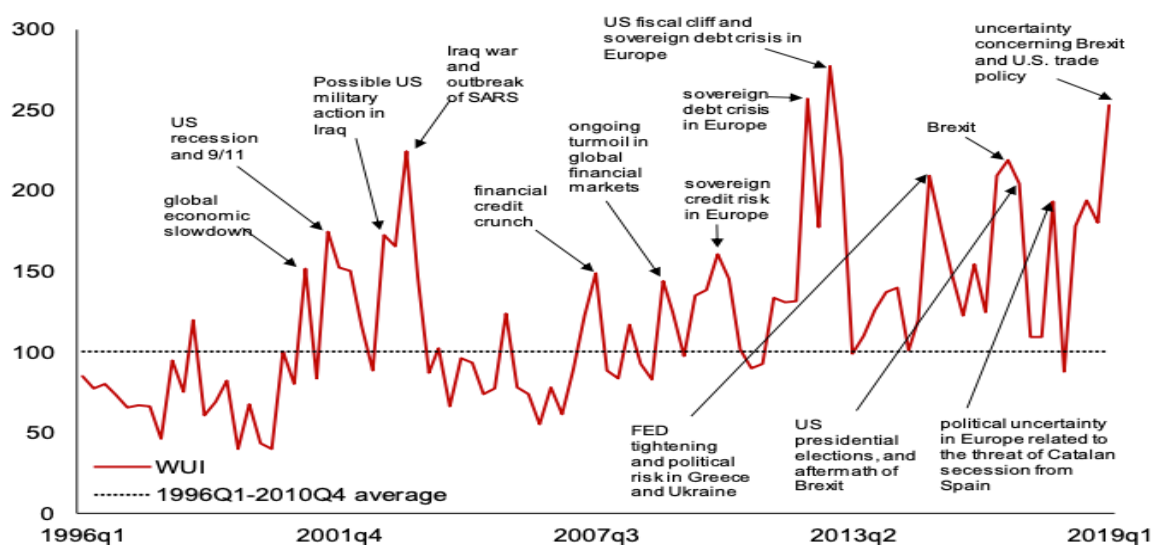
Figure 1. World Uncertainty Index (1996Q1 to 2019Q1, GDP weighted average)
Source: Ahir et al. (2019)

The role of uncertainty has taken much attention in economic theory. Davidson (1999) distinguishes between two concepts of uncertainty: classical and Keynesian. The classical theory assumes a world of perfect certainty where households and firms have complete knowledge about the external economic environment (Ricardo, 1891). Keynes defines uncertainty as a phenomenon

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whose probability cannot be calculated, leaving people without knowledge about the future (Ferrari-Filho and Camargo Conceição, 2005). The neoclassical theory of rational expectations defines uncertainty as to when individuals make their decisions based on their subjective probability distribution (Lucas, 1972). According to Kozeniauskas et al. (2018), there are three concepts of uncertainty shocks broadly used in the existing literature. The first concept is Macro uncertainty which happens when aggregate variables become less predictable. The second concept is Micro uncertainty which occurs when firms are uncertain about their outcomes due to changes in peculiar variables. The third concept is " the higher-order uncertainty", which refers to the status when people are uncertain about others' beliefs.

Uncertainty cannot be measured directly, but other variables can be used as proxies. According to Fernández-Villaverde and Guerrón-Quintana (2020), there are three most popular approaches that have been broadly used to measure uncertainty. The first approach proposes a stochastic volatility process for the variables using the likelihood approach (e.g. Fernández-Villaverde et al., 2015). The second approach uses the stock market volatility index as a proxy of uncertainty (Bloom, 2009). The third approach is building an economic policy uncertainty index using newspaper articles, the number of federal tax codes set to expire in the future, and finally, the disagreement among economic forecasters.

2.1.2 Channels through which uncertainty can impact labour Market

Uncertainty can affect the labour market by affecting the demand for goods and services in the economy on the one hand and productivity growth or credit provision on the other hand. Haddow et al. (2013) categorized the channels through which uncertainty can affect the economy into two categories as follows:

- **The demand side channels:** High uncertainty persuades households to decrease their current consumption and save more because they are unsure about their future labour income, known as risk averse (e.g. Kansiime et al., 2021; Wu and Zhao, 2022). Their consumption decisions for expensive goods will become susceptible because it is costly to reverse their decisions (e.g. Romer, 1990; Menegatti, 2010; Nam et al., 2021). For the same reasons, uncertainty can induce companies to decrease or postpone their investment, known as' wait and see' behaviour. This will decrease the wages from one hand and the demand for labour from the other hand (Bloom et al., 2018). Moreover, since the new worker's investment is partially an irreversible decision due to the high cost of hiring and firing, high uncertainty may decrease the demand for labour (Dibiasi et al.,2021).
- **The supply side channels:** Uncertainty can affect not only the demand side of the economy but also the supply side by affecting the potential productivity growth. When companies postpone or cancel their plans, this will decrease investment and hiring in the future

(Buchheim et al., 2021). According to Lazear and Spletzer (2012), high uncertainty may force workers to search for new jobs, affecting productivity by matching skills to jobs inefficiently. Moreover, it reduces banks' incentives to provide loans for individuals and firms, which will harm investment by making borrowing more expensive (Ozili, 2021). Furthermore, it can have harmful effects on asset prices because it increases the volatility, which increases the risk premium that the investor requires to compensate for the risk of holding the asset (Johnstone, 2021).

2.2 Literature review

The thesis divides the existing literature of the effects of uncertainty shocks into the following categories:

2.2.1 Macroeconomics and microeconomics Uncertainties

Uncertainty can significantly impact the economy by stifling economic growth (Bloom,2009) and affecting the household's consumption and investment decisions (Bernanke 1983). High uncertainty induces individuals to decrease their current consumption because they are unsure about their future labour income (Pástor and Veronesi, 2013). Similarly, uncertainty induces firms to postpone their investment and hiring decisions (Dixit and Pindyck, 2012). When companies postpone or cancel their plans, this will decrease investment and hiring in the future (Bloom., 2014). The demand shock caused by the households' behavior changes will harm the whole economy's production and total wealth (Bloom et al., 2012). Furthermore, uncertainty has a harmful effect on labour force participation (Fontaine, 2021). The harmful effects of uncertainty are larger during the recession (Claveria, 2021).

According to Lazear and Spletzer (2012), high uncertainty may force workers to search for new jobs, affecting productivity growth through matching skills to jobs inefficiently. Uncertainty increases wage markups (Born and Pfeifer, 2021). Moreover, it reduces banks' incentives to provide loans for individuals and firms, which will have a negative impact on investment by making borrowing more expensive (Gilchrist et al., 2014). Furthermore, it can have harmful effects on asset prices because it increases the volatility, increasing the risk premium that the investor requires to compensate for the risk of holding the asset (Bloom, 2014).

2.2.2 Financial Frictions and Uncertainty shocks

This growing thread of literature focused on the interactions between uncertainty and financial frictions. It has been argued that uncertainty shocks can have recessionary effects on the economy by affecting the firms' hiring and investment decisions (e.g. Bernanke, 1983; Bloom, 2009; Bloom et al., 2012; Bloom, 2014; Cacciatore and Ravenna; 2021; Caggiano et al., 2021). However, more recent studies argue that financial frictions can play a central role as the

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transmission mechanism through which uncertainty can affect the economy (e.g. Sim et al., 2010; Arellano et al., 2012; Arellano et al., 2019).

The existence of financial contract issues may increase the cost of capital and decrease the investment as a response to uncertainty shocks (Alessandri and Mumtaz,2019). According to (Carriere-Swallow and Cespede, 2013), the effect of uncertainty shocks relies on the level of development of the financial markets. In a financially frictionless economy, uncertainty shocks can have a less harmful impact on output (Gilchrist et al., 2014). Credit conditions can play an essential role in transmitting the effects of uncertainty to economic activity (Caldara et al., 2016). In periods of financial hardship, the harmful impact of uncertainty on actual activity is more substantial than in periods of economic expansion (Alessandri and Mumtaz, 2014).

Financial frictions can strengthen the harmful impact of uncertainty shocks on investment and hiring decisions (Bordo et al., 2016). They can also affect the supply of bank credits by decreasing the acceptance rate of new loan applications and decreasing banks' responsivity to the changes in the short-term interest rates (Alessandri and Bottero, 2020). Uncertainty about the growth of future earning can significantly impact the prediction of GDP, investment, and unemployment (Nallareddy and Ogneva, 2017). Cascaldi-Garcia and Galvao (2021) argued that when removing the financial shocks from the news shocks, the negative effect of financial uncertainty shocks is worsened in the medium run while the positive effects on news uncertainty shocks on output are strengthened in the short run. Furthermore, the harmful effect of uncertainty shocks on productivity growth is more potent in firms that depend heavily on external credits (Choi et al., 2017).

2.2.3 Uncertainty Spillovers Across Countries

This group of studies focused on examining the external uncertainty shocks as essential drivers of business cycles (e.g. Colombo,2013; Beker et al., 2016; Zhang et al., 2020; Li et al., 2020; Lyu; 2021; Gupta and Demirer, 2021). There is increasing integration between uncertainty and the economic policymaking environment across the world (Marfatia et al., 2020). According to Klößner and Sekkel (2014), international spillovers of policy uncertainty account for more than one-fourth of policy uncertainty, while Zhang et al. (2020) argue that they account for about half of economic policy uncertainty. Caggiano et al. (2017) found that the USA economic policy uncertainty shocks significantly impact the unemployment rate in the G7 countries. Śmiech et al. (2021) argued that the oil price uncertainty shocks cause a persistent drop in industrial production and interest rate. Bobasu et al. (2021) found that global uncertainty shocks are essential drivers of the fluctuations in the Euro area.

International spillovers of uncertainty shock that emerged in the United States can significantly impact the rest of the world (e.g., Colombo, 2013; Kang and Yoon, 2019; Trung, 2019; Gupta et al., 2019). According to Klößner and Sekkel (2014), the United States is the leading exporter of economic policy uncertainty shocks. A large number of uncertainty shocks in small countries is

originated abroad (Bloom, 2017). Berger et al. (2016) found that Global uncertainty shocks significantly impact inflation and output growth rate in the G7 countries. Similarly, Colombo (2013) argued that economic policy uncertainty shocks originating in the United States are an essential driver of the European policy rate. Chen and Tillmann (2021) found that monetary policy uncertainty shocks that originated in China, have a negative impact on other Asian countries. Furthermore, Cuaresma et al. (2020) found that output, inflation, prices, exports, equity prices, and interest rates respond negatively to international uncertainty. It increases the fragility; however, the exact degree of fragility varies across the G7 countries depending on their structural differences.

2.2.4 The Economic policy-related Uncertainty Shocks

Economic policy uncertainty can significantly affect the economy (e.g. Fernández-Villaverde et al, 2015; Demir and Ersan. 2017Adedoyin and Zakari, 2020; Zhang et al. 2020; Caggiano et al., 2020; Payne et al. 2021, Zhang et al.; 2021; Choi and Yoon, 2021; Rodrigues, 2021; Belianska et al., 2021). According to Omran and Bilan (2020), unemployment increases due to a favourable tax revenue shock while it decreases as a response to a positive government spending shock. Carrière-Swallow and Céspedes (2013) suggested that fiscal and monetary policy procedures that reduce the credit restrictions that firms face can play an essential role in reducing the harmful effects of uncertainty on emerging economies. Furthermore, it can play a vital role in counterbalancing uncertainty shocks' harmful effects during regular times (Basu and Bundick, 2017).

Baker et al. (2016) argue that economic policy uncertainty can have a harmful impact on the economy. Ghirelli et al. (2021) show that economic policy and financial uncertainty shocks have a negative impact on private consumption. Clance et al. (2021) claim that economic policy uncertainty increases corporate taxes. Nevertheless, Croce et al. (2012) show that fiscal policies that promote short-run stabilization could play an essential role in decreasing uncertainty, decreasing the long-run growth, and increasing the long-run risk. Jerow (2018) claims that high uncertainty shocks weaken the impact of fiscal policy on the economy. Cesa-Bianchi et al. (2014) argue that the current financial market volatility positively and significantly impacts future output growth.

On the contrary, volatility shocks have no impact on business cycles. Furthermore, the study argues that volatility is a manifestation instead of a cause of economic instability. Furthermore, Caldara et al. (2016) claim that uncertainty shocks that do not depend on financial asset prices are considered an essential origin of macroeconomic fluctuations. Dery and Serletis (2021) argued that uncertainty shocks had become more important sources of fluctuations than the traditional financial and monetary shocks.

2.2.5 The Asymmetric Effects of Uncertainty

The empirical literature provides a piece of evidence that uncertainty has recessionary effects on the economy (e.g. Bloom et al., 2007, Bloom, 2009,

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Bloom, 2014; Stock and Watson, 2012; Rossi and Sekhposyan, 2015; Jurado et al. 2015; Leduc and Liu, 2013; Bordia et al. 2016; Pástor and Veronesi, 2013; Castelnuovo,2019; Nalban and Smădu, 2021). Bloom (2009) found that uncertainty shocks produce a fast drop and rebound in employment and output because, during high uncertainty, firms tend to delay their hiring and investment decisions. Also, the GDP growth falls due to the delay in investment. Furthermore, it concluded that uncertainty shocks generate temporary sharp recessions followed by recoveries.

Cohen and Alexopoulos (2009) showed that uncertainty negatively impacts employment, labour productivity, Industrial production, consumption, and investment. Moreover, uncertainty shocks generate sharp recessions followed by recoveries. Ghosal and Loungani (2000) found that uncertainty has a negative impact on investment. This impact is ultimately more significant in the industries dominated by small firms than in the industries dominated by large firms. Caggiano et al. (2014) showed that uncertainty has an asymmetric effect on unemployment over the business cycle. The reaction of unemployment and inflation to uncertainty shocks is stronger during the economic downturn.

However, recent studies argue that the effects of uncertainty shocks are asymmetric, and there is a non-linear relationship between uncertainty and the stance of monetary policy (e.g. Caggiano et al. 2014; Caggiano et al. 2015; Caldara et al., 2016; Aastveit et al., 2017; Caggiano et al. 2020). Caggiano et al. (2017) found that the systematic monetary policy is less effective during the economic downturn in stabilizing the business cycle. Moreover, the response to unemployment and industrial production varies depending on the source of uncertainty shocks.

2.2.6 Natural Disasters as Sources of Uncertainty

According to Castelnuovo et al. (2017), It is challenging to identify uncertainty shocks because uncertainty and business cycles move sequentially. Uncertainty could be either an endogenous response to other shocks or an exogenous driver of the business cycle. It could be an endogenous response to fluctuations or an exogenous source for business cycle variation. Moreover, higher uncertainty induces firms to pause their hiring and investment decisions, decreasing productivity growth in the short term. Simultaneously, it generates an overshot in labour, productivity, and output in the medium term (Bloom,2009). The macroeconomic effects of uncertainty on the actual variables are generally weaker than what proxies suggest, while financial uncertainty and credits spread negatively impact GDP. Moreover, the financial crisis and the dot-com recession support these findings. Nevertheless, the narrative events related to political uncertainty have a more substantial impact on GDP (Redl,2017).

Empirical studies reported a negative effect of uncertainty on growth (Barro, 1991, Ramey and Ramey, 1995, Carrière-Swallow and Céspedes, 2013). Bhagat et al. (2013) reported a negative impact of uncertainty on India's GDP and investment. Similarly, Sahinoz and Cosar (2020) found a negative impact of

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uncertainty on Turkey's economic activity and investment. According to Fernández-Villaverde et al. (2015), Fiscal volatility shocks can have harmful consequences on economic activity. On the contrary, Baharumshah et al. (2016) argued that inflation uncertainty stimulates economic growth in non-inflation crisis countries.

3. RESEARCH PROBLEM, QUESTIONS, AND OBJECTIVES

3.1 Research Problem

According to (Fadl, 2015), the Egyptian labour market is in a censorious situation. It faces many problems, including poor quality of education, a low female participation rate in the workforce, a high unemployment rate, and a low growth rate in the private sector because of the high preference of public sector employment between new entrants (Assaad and Krafft, 2013). Despite their high educational attainment, almost one-third of Egyptian youth are neither in employment nor in education, and one-sixth of the economically active youth population is unemployed (Barsoum et al., 2014).

Since the financial crisis of 2008, the Egyptian economy has faced many unanticipated adverse shocks due to political, security, and economic instability from one hand and the decisions which the government has taken to re-stabilize the economy from the other hand. These incidents have forced both households and companies to become more "uncertain" about the current and future economic conditions. Higher uncertainty induces firms to pause their hiring and investment decisions, which affects, labour, productivity, and growth.

Furthermore, there is a research gap in previous studies of uncertainty and labour market as follows:

- Earlier studies focused mainly on examining the impact of uncertainty on investment, while most recent studies focused on the impact of uncertainty shocks on the economy. Furthermore, they have not given much attention to the impact of uncertainty on the labour market, especially unemployment, labour productivity, and wages.

- Most previous studies concentrated on investigating the impact of uncertainty shocks in developed countries. According to Myint (1971), the generalizations of economic theory are based on the specific conditions of the developed countries, and therefore, they are not valid for developing countries.

- According to Bloom (2014), uncertainty tends to be higher in developing countries than the developed countries because they have the most volatile GDP growth rates, stock markets, and exchange rates. Since there is a difference in economic conditions and labour market structure between developed and developing countries, it creates space for researchers to

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carry out a thorough investigation of this phenomenon in developing countries such as Egypt.

- The current high uncertainty because of the COVID-19 crisis encourages researchers to examine its effects on the labour market, especially in developing countries. Due to low health care capacity, poor governance, low fiscal space, shallow financial markets, and large informal sectors. The catastrophic consequences of the crisis on developing countries are expected to be higher than the developed countries (Loayza and Pennings, 2020).

Considering the above, this Ph.D. thesis aims to fill this gap by examining how the Egyptian labour market responds to uncertainty shocks.

3.2 Research Questions
The research questions can be formalized as follows:
1. What is the effect of uncertainty on the weekly average wage in Egypt?
2. What is the effect of uncertainty on labour productivity in Egypt?
3. What is the effect of uncertainty on the unemployment rate in Egypt?

3.3 Research Objectives
The main research objective is to investigate the impact of uncertainty shocks on the Egyptian labour market. The sub research objectives can be formalized as follows:
1. To assess the effect of uncertainty on the weekly average wage in Egypt.
2. To assess the effect of uncertainty on labour productivity in Egypt.
3. To assess the effect of uncertainty on the unemployment rate in Egypt.

4. RESEARCH METHODOLOGY

Egypt has suffered from a severe economic fall which started with the world financial crisis of 2008/2009 and enlarged after the 25th of January 2011, revolution (Assaad and Krafft, 2013). Since this date, it has faced many critical events, including changes in labour and investment laws (Talaat et al., 2016); Currency floating regime (Massoud and Willett, 2014); increasing terror attacks (Awad and Hashem,2015); and political instability (Abdelkader,2017). The high level of uncertainty because of these events has had its implications on the Egyptian economy.

4.1 Data
To explore how the Egyptian labour market reacts to uncertainty shocks, a quarterly time-series data from 2003 Q4 to 2021Q2 and the EViews software have been used. The reason of choosing this period is that it has witnessed many economic, political, and security shocks. A detailed explanation of these shocks is presented in chapter six. Some variables of were transformed from high

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frequency(monthly) to low frequency(quarterly) to harmonize the dataset. A detailed explanation of the variables of the study is included in appendix 12. The dataset has been collected from Egypt's central bank (CBE), World Bank, Ministry of Manpower and Immigration, Central Agency for Public Mobilization and Statistics (CAPMAS), International Monetary fund (IMF), and Egypt State Information Services (SIS). The variables of the model are displayed in table 1.

Table.1 The variables of the study

Variables	Definitions
STK	EGX 30 index will be used as a proxy of uncertainty
IP	Industrial production
CPI	Consumer price index
INT	Interest rate
ITEM	Unemployment rate
LBG	Labour productivity growth
GDP	Gross domestic product
AW	Weekly average wage

Source: Author

4.2 Research Methods

The methodology of this doctoral thesis is driven by the study of Bloom (2009), which used the stock market volatility index as a measure of macro uncertainty shocks. The author will use this measure because, compared to other measures of uncertainty, it is more likely to be instructive regarding uncertainty shocks (Jurado et al., 2015). It has been broadly used in previous literature, and the accessibility of its data. According to Del Negro and Schorfheide (2011), the vector autoregressive (VAR) model is one of the most important modern macroeconomics instruments. The forecasts obtained from this model seem more straightforward than those obtained from far more complex models. (McNees, 1986).

Before running the vector autoregressive (VAR) model, we must ensure that all the variables are stationary. In other words, we need to confirm that there is no unit root in the time series. According to (Granger and Newbold, 1974), using non-stationary data may cause a spurious regression. To do so, we run the augmented Dickey-Fuller test statistic at a 5% level of significance. The null

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hypothesis is that the variable has a unit root, while the alternative hypothesis is that the variable has no unit root, which means it is stationary.

The next step is determining the number of lags we will use in the VAR estimation to constitute an individual white noise. Using a concise lag length may lead to a poorly specified vector auto-regressive VAR model, while using an extremely long lag length may lose too many degrees of freedom. According to Lütkepohl (1990), underfitting the lag length may increase the mean-square forecast error, while overfitting the lag length may raise the mean-square forecast error of the vector auto-regressive (VAR) model.

To check causality among the variables of our VAR model, we will run the VAR Granger causality/Block Exogeneity Wald tests. The null hypothesis is that the joint lagged coefficients are equal to zero, while the alternative hypothesis is that the joint lagged coefficients are not equal to zero. However, It is worth mentioning that the Granger causality test is not being taken literally as it merely tests for predictive power. Thus, it does not collide with the thesis's limitations, which correctly acknowledges that it does not focus on the causality of uncertainty shocks and growth.

For the impulse response functions, the author assumes that shocks spontaneously affect the levels of the stock market index, then prices, interest rate, unemployment, and finally, output. Therefore, to establish the impulse response functions, we set the variables according to Cholesky ordering: we start with the EGX30 index, then interest rate, weekly average wage, consumer price index, unemployment rate, labour productivity growth, and finally output. Following Bloom (2009), a seven- variables vector autoregressive model (VAR), and the impulse response functions (IRF) will be applied to capture the relationship. According to Sims (1980), The vector autoregressive (VAR) model can be presented as follows:

$$Y_t = \alpha_0 + \alpha_1 y_{t-1} + \cdots + \alpha_m y_{t-m} + u_t \qquad (5.1)$$

Where:

α_i denotes the coefficient matrices.

α_0 denotes the constant of the equation

y_t denotes a set the endogenous variables.

t is the time trend.

u_i signifies the stochastic error term for the VAR model.

Therefore, the seven- variables VAR models can be specified as follows:

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$$GDP_t$$

$$= a_1 + \sum_1^k b_{1i} GDP_{t-1} + \sum_1^k c_{1i} STK_{t-1} + \sum_1^k d_{1i} INT_{t-1} + \sum_1^k e_{1i} CPI_{t-1}$$

$$+ \sum_1^k f_{1i} UNEM_{t-1} + \sum_1^k g_{1i} LPG_{t-1} + \sum_1^k h_{1i} WAW_{t-1}$$

$$+ u_{1t} \tag{5.2}$$

$$STK_t = a_2 + \sum_1^k b_{2i} GDP_{t-1} + \sum_1^k c_{2i} STK_{t-1} + \sum_1^k d_{2i} INT_{t-1} + \sum_1^k e_{2i} CPI_{t-1}$$

$$+ \sum_1^k f_{2i} UNEM_{t-1} + \sum_1^k g_{2i} LPG_{t-1} + \sum_1^k h_{2i} WAW_{t-1}$$

$$+ u_{2t} \tag{5.3}$$

$$INT_t$$

$$= a_3 + \sum_1^k b_{3i} GDP_{t-1} + \sum_1^k c_{3i} STK_{t-1} + \sum_1^k d_{3i} INT_{t-1} + \sum_1^k e_{3i} CPI_{t-1}$$

$$+ \sum_1^k f_{3i} UNEM_{t-1} + \sum_1^k g_{3i} LPG_{t-1} + \sum_1^k h_{3i} WAW_{t-1}$$

$$+ u_{3t} \tag{5.4}$$

$$CPI_t$$

$$= a_4 + \sum_1^k b_{4i} GDP_{t-1} + \sum_1^k c_{4i} STK_{t-1} + \sum_1^k d_{4i} INT_{t-1} + \sum_1^k e_{4i} CPI_{t-1}$$

$$+ \sum_1^k f_{4i} UNEM_{t-1} + \sum_1^k g_{4i} LPG_{t-1} + \sum_1^k h_{4i} WAW_{t-1}$$

$$+ u_{4t} \tag{5.5}$$

$$UNEM_t = a_5 + \sum_1^k b_{5i} GDP_{t-1} + \sum_1^k c_{5i} STK_{t-1} + \sum_1^k d_{5i} INT_{t-1}$$

$$+ \sum_1^k e_{5i} CPI_{t-1} + \sum_1^k f_{5i} UNEM_{t-1} + \sum_1^k g_{5i} LPG_{t-1}$$

$$+ \sum_1^k h_{5i} WAW_{t-1} + u_{5t} \tag{5.6}$$

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$$LPG_t = a_6 + \sum_{1}^{k} b_{6i}\, GDP_{t-1} + \sum_{1}^{k} c_{6i}\, STK_{t-1} + \sum_{1}^{k} d_{6i}\, INT_{t-1}$$

$$+ \sum_{1}^{k} e_{6i}\, CPI_{t-1} + \sum_{1}^{k} f_{6i}\, UNEM_{t-1} + \sum_{1}^{k} g_{6i}\, LPG_{t-1}$$

$$+ \sum_{1}^{k} h_{6i}\, WAW_{t-1} + u_{6t} \tag{5.7}$$

$$WAW_t = a_7 + \sum_{1}^{k} b_{7i}\, GDP_{t-1} + \sum_{1}^{k} c_{7i}\, STK_{t-1} + \sum_{1}^{k} d_{7i}\, INT_{t-1}$$

$$+ \sum_{1}^{k} e_{7i}\, CPI_{t-1} + \sum_{1}^{k} f_{7i}\, UNEM_{t-1} + \sum_{1}^{k} g_{7i}\, LPG_{t-1}$$

$$+ \sum_{1}^{k} h_{7i}\, WAW_{t-1} + u_{7t} \tag{5.8}$$

4.3 Conceptual framework

The conceptual framework for the thesis is presented in figure 2. In the vector auto-regressive (VAR) model, the main goal is to test the response of other variables to an uncertainty shock, measured by the stock market index (EGX30) which represents the biggest 30 companies in terms of activity and liquidity in the Egyptian stock market. Moreover, the reaction of other variables to a shock in one variable has been also tested.
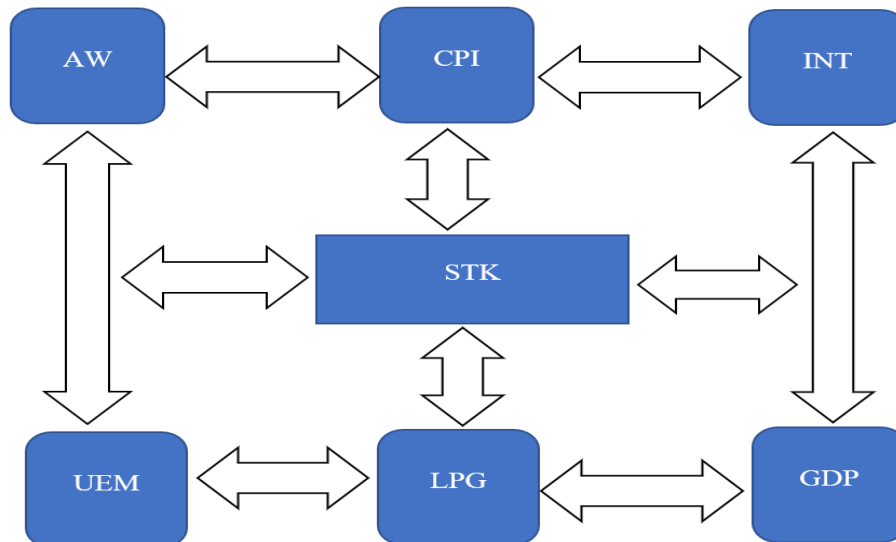

Figure 2. The conceptual framework for the study.
Source: Author

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5. DATA ANALYSIS AND RESULTS

5.1 Augmented Dickey-Fuller test

Table 2 shows the Augmented Dickey-Fuller (ADF) test with intercept. As we can see, all the variables except LPG were non-stationary at levels, but when we took the First difference, they became stationary which means that all the variables have no unit root. Table 3 shows the augmented Dickey-Fuller (ADF) test with the trend and intercept. As it is shown, all the variables except LPG and LGDP were non-stationary at levels, but when we took the first difference, they became stationary, which means that all the variables of the VAR model have no unit root. Table 4 shows the Augmented Dicky fuller test without trend and intercept. As we can see, all the variables except LPG were non-stationary at levels, but when we took the first difference, they became stationary which means that all the variables of the VAR model have no unit root. Furthermore, the graphs of variables in level and the first difference are presented in appendices 14 and15.

Table 2. Augmented Dickey-Fuller test (Intercept)

VARIABLE	P-VALUE	UNIT ROOT	STATIONARY
LEVELS			
LSTK	0.0249	YES	NO
LINT	0.2168	YES	NO
LWAW	0.3383	YES	NO
LCPI	0.0504	YES	NO
LUNEM	0.7573	YES	NO
LPG	0.0006	NO	YES
LGDP	0.8932	YES	NO
FIRST DIFFERENCE			
LSTK	0.0000	NO	YES
LINT	0.0000	NO	YES
LWAW	0.0000	NO	YES
LCPI	0.0000	NO	YES
LUNEM	0.0000	NO	YES
LPG	0.0000	NO	YES
LGDP	0.0073	NO	YES

Source: Author's calculations

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Table 3. Augmented Dickey-Fuller test (Trend and intercept)

VARIABLE	P-VALUE	UNIT ROOT	STATIONARY
LEVELS			
LSTK	0.0583	YES	NO
LINT	0.5424	YES	NO
LWAW	0.9761	YES	NO
LCPI	0.1836	YES	NO
LUNEM	0.9249	YES	NO
LPG	0.0045	NO	YES
LGDP	0.0190	NO	YES
FIRST DIFFERENCE			
LSTK	00.0000	NO	YES
LINT	0.0000	NO	YES
LWAW	0.0000	NO	YES
LCPI	0.0000	NO	YES
LUNEM	0.0049	NO	YES
LPG	0.0000	YES	YES
LGDP	0.0000	YES	YES

Source: Author's calculations

Table 4. Augmented Dickey-Fuller test (No trend and intercept)

VARIABLE	P-VALUE	UNIT ROOT	STATIONARY
LEVELS			
LSTK	0.8677	YES	NO
LINT	0.7057	YES	NO
LWAW	0.9590	YES	NO
LCPI	0.2964	YES	NO
LUNEM	0.4032	YES	NO
LPG	0.0034	NO	YES
LGDP	0.9994	YES	NO
FIRST DIFFERENCE			
LSTK	0.0000	NO	YES
LINT	0.0000	NO	YES
LWAW	0.0000	NO	YES
LCPI	0.0000	NO	YES
LUNEM	0.0000	NO	YES
LPG	0.0000	NO	YES
LGDP	0.0000	NO	YES

Source: Author's calculations

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5.2 Lag length Criterion

Here we need to choose the optimal lag for the vector autoregressive (VAR) model. As we can see in table 5, Schwarz information criterion and Hannan-Quinn information criterion suggests using one lag. Nevertheless, Sequential modified LR test statistic, Final prediction error and Akaike information criterion suggests using four lags therefore we run the VAR model at lag four.

Table 5. Lag length criterion test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	237.3384	NA	2.19e-12	-6.979952	-6.747716*	-6.888185*
1	287.1260	87.50549	2.16e-12	-7.003819	-5.145930	-6.269679
2	364.2581	119.2041	9.67e-13	-7.856306	4.372765	-6.479794
3	423.3245	78.75522	8.10e-13	-8.161349	-3.052155	-6.142464
4	512.3209	99.78377*	3.14e-13*	-9.373360*	-2.638512	-6.712101

Source: Author's calculations

5.3 Impulse response functions (IRF)

Following the work of Bloom (2009), we assume that shocks spontaneously affect the levels of the stock market index, then prices, interest rate, unemployment, and finally output. Therefore, to establish the impulse response functions, we set the variables according to Cholesky ordering as follows: we start with the STK index, then interest rate, weakly average wage, consumer price index, unemployment rate, labour productivity growth, and finally output. For the confidence intervals, I used the Analytic (asymptotic)—SEs method introduced by Lütkepohl (1990) where the SEs confidence bands are computed as +/-2 SE confidence bands.

Figure 3 shows the response of the variables to a one standard deviation shock in the stock market index. The first panel shows the interest rate response to a one standard deviation shock in the stock market index. At the earlier stages, the interest rate increases slightly until period two and decreases until we reach period three. After that, it decreases gradually until it hits the steady-state in period six, then it increases again after period seven, and finally, it becomes negative after period eight. The second panel shows the weekly average wage response to a one standard deviation shock in the stock market index. As we can see, at the earlier stages, the weekly average wage increases until period three, then it decreases slightly and become negative in period five, then increases again until period six, and finally, it falls until it hits the steady-state in the period seven.

Moving to the third panel, we can see that a one standard deviation shock in the stock price index has a fragile impact on the consumer price index until it

hits the steady-state in period six and continues decreasing until it rebounds again after period nine, but it remains under the steady-state. The fourth panel shows that a one standard deviation shock to the stock price index increases unemployment until we reach period three. It decreases gradually until it hits the steady-state in period four. It rises again after period five until it hits the steady-state in period seven. It increases until period eight, and finally, it started to decrease after period nine then became negative. We can conclude that unemployment fluctuates as a reaction to uncertainty shock.

The fifth panel shows that labour productivity growth fluctuates due to a one standard deviation shock to the stock market index. At the earlier stages, it decreases until we reach period two, then increases again until period three, then it continues fluctuating above and under the steady-state until we get period ten. Therefore, we can conclude that uncertainty shock harms labour productivity growth. Furthermore, finally, the sixth panel indicates the response of the Gross domestic product growth rate to a one standard deviation shock to the stock market index. As we can see, at the earlier stages, GDP decreases until we reach period three, then increases in period four, decreases until it hits the steady-state after period six, increase until period eight, and finally, decreases again. Nevertheless, since confidence intervals contain zero, the results of impulse response functions are statistically insignificant.

Figure 3. The responses to the stock market shocks.
Source: Author

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6. DISCUSSION

Uncertainty, which is defined as the absence of information about the future, has become a buzzword in the academic arena over the past three decades due to the development of knowledge-driven and e-business enterprises (e.g. Kohn and Simpson, 2004; Song, 2013; Ramayah et al., 2020). Milliken (1981) considers uncertainty "an individual's perceived inability to predict something accurately". Many managerial studies consider uncertainty as the main factor in explaining other management concepts such as organizational behaviour, strategic management, project management, and organizational learning (e.g., Karlsen, 2011; Furr and Eisenhardt, 2021).

The thesis employed a vector autoregressive (VAR) model, Impulse response function, and Granger causality test. According to Del Negro and Schorfheide (2011), the vector autoregressive (VAR) model is one of the most important modern macroeconomics instruments. The forecasts obtained from this model seem simpler than those obtained from far more complex models. (McNees, 1986). Furthermore, the author employed a quantitative research approach where quarterly time series data for the period from 2003 Q4 to 2021Q2 and EViews 12 University Edition statistical software were used to obtain the research results.

The motivation for writing this doctoral thesis was to investigate changes in the Egyptian labour market influenced by uncertainty shocks. The predefined conceptual framework model presented in chapter four has been tested using the statistical analysis presented in chapter five. In the vector auto-regressive (VAR) model, the main goal is to test the response of other variables to an uncertainty shock, measured by the stock market index (EGX30) which represents the biggest 30 companies in terms of activity and liquidity in the Egyptian stock market. Moreover, the reaction of other variables to a shock in one variable has been tested.

The main objective of the thesis is to investigate how the Egyptian labour market reacts to uncertainty shocks. The sub research objectives can be formalized as follows:

1. To assess the effect of uncertainty on the weekly average wage in Egypt.
2. To assess the effect of uncertainty on labour productivity in Egypt.
3. To assess the effect of uncertainty on the unemployment rate in Egypt.

To achieve the research objectives, the three research questions, stated in Chapter four, have been answered as follows:

First research question: *What is the effect of uncertainty on the weekly average wage in Egypt?*

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The impulse response functions showed that at the earlier stages, as a response to an uncertainty shock, the weekly average wage increases until period three, then it decreases slightly and becomes negative in period five, then increases again until period six. Finally, it falls until it hits the steady-state in period seven. Thus, uncertainty shocks temporarily increase the weekly average wage in the short run. However, it falls again in the long run. This result is consistent with the finding of Bloom (2009), and Bloom et al. (2018). Nevertheless, it contradicts the findings of Basu and Bundick (2017), and Di Maggio et al. (2020).

Second research question: *What is the effect of uncertainty on labour productivity in Egypt?*

The impulse response function shows that labour productivity growth fluctuates due to a one standard deviation shock to the stock market index. At the earlier stages, it decreases until we reach period two, then increases again until period three. It continues fluctuating above and under the steady-state until we get period ten. Therefore, we can conclude that uncertainty shock harms labour productivity growth. This result is consistent with the findings of Bloom(2009) Riegler(2014), Choi et al. (2018), Lhuissier et al. (2021), and Bonciani (2022).

Third research question: *What is the effect of uncertainty on the unemployment rate in Egypt?*

The impulse response function results show that a one standard deviation shock to the stock price index increases unemployment until we reach period three. It decreases gradually until it hits the steady-state in period four. It rises again after period five until it hits the steady state in period seven. It increases until period eight, and finally, it started to decrease after period nine and then became negative. Therefore, uncertainty shocks cause a sharp increase in unemployment in the short run. This result is consistent with the findings of Mianand Sufi (2014), Alexopoulos and Cohen (2015), Redl (2018), Wen et al.(2019), and Kovalenko (2021).

Thus, uncertainty shocks generate temporary a sharp recession and recovery. These results are consistent with the findings of Bloom (2009), Bloom et al. (2014), Ferrara and Guérin (2016), Redl (2017), Bloom et al. (2018), Bonciani and Ricci (2020), Nalban and Smădu (2021), and Liu (2021) which implies that uncertainty shocks generate a significant fall and rebound in employment, GDP, and labour productivity because higher uncertainty induces firms to pause their hiring and investment decisions. This will decrease the wages from one hand and the demand for labour from the other hand (e.g. Dixit and Pindyck., 2012; Nikiforos, 2017; Bloom et al., 2018). Since the new worker's investment is partially an irreversible decision due to the high cost of hiring and

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firing, high uncertainty may decrease the demand for labour (e.g. Pindyck, 1990; Lotti and Viviano, 2012; Dibiasi et al.,2021).

Uncertainty can significantly impact the economy by stifling economic growth (Bloom,2009) and affecting the household's consumption and investment decisions (Bernanke 1983). High uncertainty induces individuals to decrease their current consumption because they are unsure about their future labour income (Pástor and Veronesi, 2013). Similarly, uncertainty induces firms to postpone their investment and hiring decisions (Dixit and Pindyck, 2012). When companies postpone or cancel their plans, this will decrease investment and hiring in the future (Bloom., 2014). The demand shock caused by the households' behavior changes will harm the whole economy's production and total wealth (Bloom et al., 2012). Furthermore, uncertainty has a harmful effect on labour force participation (Fontaine, 2021). The harmful effects of uncertainty are larger during the recession (Claveria, 2021).

Moreover, uncertainty can affect the labour market by affecting potential productivity growth. When companies postpone or cancel their plans, this will decrease investment and hiring in the future (e.g. Bloom., 2009; Campello et al., 2010; Buchheim et al., 2021, Al-Thaqeb et al. 2021). According to Lazear and Spletzer (2012), high uncertainty may force workers to search for new jobs, affecting productivity by matching skills to jobs inefficiently. Moreover, it reduces banks' incentives to provide loans for individuals and firms, which will harm investment by making borrowing more expensive (e.g. Sim et al., 2010; Nguyen, 2021; Didier et al., 2021; Ozili, 2021). Furthermore, it can have harmful effects on asset prices because it increases the volatility, which increases the risk premium that the investor requires to compensate for the risk of holding the asset (e.g. Zhou, 2018; Roh et al., 2020; Balcilar, 2020; Johnstone, 2021).

7. CONTRIBUTION, LIMITATIONS, AND FUTURE RESEARCH DIRECTIONS

This section describes the benefits of this study for the theory and practice as well as its limitations as follows:

7.1 Contribution to Science

Uncertainty plays a vital role in economic analyses of markets by providing us with quantitative answers to important policy questions (Hansen,2017). This study bestows the existing literature on the labour market and how it reacts to uncertainty shocks. Most previous studies concentrated on investigating the impact of uncertainty shocks in developed countries. According to Myint (1971), the generalizations of economic theory are based on the specific conditions of the developed countries and therefore, they are not valid for developing countries. Moreover, according to Bloom (2014), uncertainty tends to be higher in developing countries than the developed countries because they have the most volatile GDP growth rates, stock markets and exchange rates. Since there is a

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difference in economic conditions and labour market structure between developed and developing countries, it creates space for researchers to carry out a thorough investigation of this phenomenon in developing countries such as Egypt.

Moreover, previous studies have not given much attention to the impact of uncertainty on the labour market, especially unemployment, labour productivity, and wages. Since there is a difference in economic conditions and labour market structure between developed and developing countries, it creates space for researchers to carry out a thorough investigation of this phenomenon in developing countries such as Egypt because the characteristics of the Egyptian Economy is quite different from the characteristics of developed countries.

7.2 Contribution to practice

This thesis is practically significant mainly because of the consequences of the current pandemic and the geopolitical situation. The high uncertain climate encourages researchers to focus on investigating how the labour market reacts to uncertainty shocks, and how to alleviate the harmful effects of these shocks.

There is limited research conducted to investigate the relationship between uncertainty and the labour market in developing countries as most previous studies focused mainly on developed countries. Earlier studies focused mainly on the impact of uncertainty on investment, while most recent studies focused on the impact of uncertainty shocks on the economy. And thus, they have not given much attention to the impact of uncertainty shocks on the labour market, especially unemployment, labour productivity, and wages.

Furthermore, it helps policymakers and investors to create an overall strategy to alleviate the harmful effects of uncertainty shocks. Finally, the results of this thesis can inspire other researchers in Egypt and other developing countries to apply the same methodology to other countries or try to develop a different methodology using a different measure of uncertainty.

7.3 Limitations of the thesis

This thesis contributes and adds to the existing literature on uncertainty and the labour market; however, some limitations may encourage future research to cover. These limitations can be summarized as follows:

- The thesis used only one measure of uncertainty which is the stock market volatility.
- The current measures of uncertainty shocks are just proxies, therefore, is important to develop a wider real range of uncertainty measures.
- The thesis did not focus on the causality of uncertainty shocks and growth.
- It is necessary to examine fiscal and monetary policies' role in reducing the harmful effects of uncertainty.
- The thesis did not differentiate between the sources of uncertainty shocks.
- The results of this thesis cannot be used for generalization because each country has its labour market structure and conditions.

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7.4 Future research directions

- It would be interesting to examine the role of innovation in reducing uncertainty.
- Since the study used only one measure of uncertainty, the thesis suggests for future research to apply other measures of Uncertainty if there will be access to data.
- Similar studies can be replicated in some other developing countries using the same measure of uncertainty or applying other measures.
- The thesis encourages future research to examine the effect of one event such as tax cuts, deregulations, the 25th of January revolution, or COVID-19 pandemic on the labour market in Egypt.

8. CONCLUSION

The current economic overview has become highly uncertain. Uncertainty about how individuals and firms react to the future evolution of the economy is the primary concern of policymakers in both developed and developing countries. Uncertainty appears after significant shocks such as revolutions, natural disasters, financial and economic crises, and elections. According to the real options theory, uncertainty innovations come from the "wait and see the effect". Uncertainty in the business environment will force firms to delay or stop investing and hiring, and thus the economy will fall into recession (Bachmann and Bayer, 2013). This doctoral thesis aims to contribute to the existing literature by examining the impact of uncertainty shocks on the labour market in Egypt. The author employed quarterly time series data from 2003Q4 to 2021Q2. The Vector autoregressive (VAR) model and the impulse function (IRF) tool were used to capture the impact of uncertainty shocks on the weekly average wage, labour productivity, and the unemployment rate. The author used the EViews 12 University Edition statistical software for data analysis. The data has been collected from Egypt's central bank (CBE), the world bank, the Ministry of Manpower and Immigration, the Central Agency for Public Mobilization and Statistics (CAPMAS), the International Monetary fund (IMF), and Egypt State Information Service (SIS).

The impulse response functions showed that, At the earlier stages, the interest rate slightly increases until period two and decreases until we reach period three. After that, it falls gradually until it hits the steady-state in period six, then it rises again after period seven, and finally, it becomes negative after period eight. Moving to the response of weekly average wage to uncertainty shocks, it increases until period three. It decreases slightly and becomes negative in period five, then rises again until period six, and finally, it drops until it hits the steady-state in period Seven. Moving to the consumer price index response to uncertainty shocks, the results showed that uncertainty shocks have a fragile impact on the consumer price index until it hits the steady-state in period six and continues decreasing until it rebounds again after period nine remains under the steady-state.

When it comes to the response of unemployment to uncertainty shocks, it increases until we reach period three. It decreases until it hits the steady-state in period four. It increases after period five until it hits the steady-state in period seven. It increases until period eight, and finally, it starts to decrease after period nine and becomes negative. Moving to the response of productivity growth to uncertainty shocks, it decreases until we reach period two, then increases again until period three. It continues fluctuating above and under the steady-state until we get period ten. And finally, GDP growth rate GDP decreases until we reach period three, then increases in period four, decreases until it hits the steady-state after period six, increases until period eight, and finally reduces again. Therefore, we can conclude that in the short run, uncertainty shocks, measured by the stock market index (EGX30), cause a sharp drop in employment, GDP, and labour productivity growth. At the same time, it increases weakly average wages, consumer price index, and interest rate. Nevertheless, since the confidence intervals contain zero, the results of impulse response functions are statistically insignificant.

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LIST OF PUBLICATIONS OF THE AUTHOR

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2. Omran, E. A. M., & Bilan, Y. (2021). The impact of inflation on the unemployment rate in Egypt: a VAR approach. In SHS Web of Conferences (Vol. 107, p. 06009). EDP Sciences.

3. Odei, M., & Omran, E. A. M. (2021). Entrepreneurial activities among Universities in the Czech Republic. In 17 th Annual International Bata Conference for Ph. D. Students and Young Researchers (p. 365).

4. Omran, E. A. M., & Bilan, Y. (2020). The impact of fiscal policy on the unemployment rate in Egypt. Montenegrin Journal of Economics.

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6. Aliu, F., Krasniqi, B., Omran, E. A. M., & Zylfiu, A. (2019). International Risk Analysis Based on The Portfolio Diversification: The Case of Prague Stock Exchange. MANAGEMENT, BUSINESS, AND ECONOMICS, 124.

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The Impact of Uncertainty on The Labour Market in Egypt

Důsledky nejistoty na trh práce v Egyptě

Doctoral Thesis Summary