Labour Demand, Firm Survival & Productivity in Dual Labour Markets
The Case of the Nitaqat Policy in Saudi Arabia

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Labour Demand, Firm Survival & Productivity in Dual Labour Markets: The Case of the Nitaqat Policy in Saudi Arabia

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To my father

ABSTRACT

The private sector in Saudi Arabia has the features of a dual labour market – it relies heavily on foreign labour, comprising around 90% of its employment, with regulated pay differences between nationals and foreigners. In 2011, the Saudi Ministry of Labor introduced the 'Nitaqat' program, which imposes an industry quota of national employment on private firms. The policy's main aim is to raise the employment levels of nationals in the private sector. With strict sanctions imposed on non-compliant firms, the policy has a high compliance rate, but imposes significant costs on firms.

Using a dataset from the Ministry of Labor covering the whole population of firms subject to Nitaqat, this thesis uses an econometric approach to study the impact of Nitaqat on Saudi employment, foreign employment and the exit rate of firms. This builds on existing literature by analysing the policy using a difference-in-differences approach. The results suggest that the policy has improved Saudization (the ratio of Saudis to total employment), but at a significant cost to firms, since it raised exit rates and reduced total employment in surviving firms. In addition, it undertakes a descriptive analysis of the economy before and after the policy implementation, using individual level data from 2009 to 2015. This studies the difference in earnings between Saudis and non-Saudis in relation to skill levels, industry of employment and region. However, there was not enough evidence to directly link the results to Nitaqat. Hence, a final analysis is based on a merge at industry level between the Nitaqat dataset and the Annual Establishment Survey to measure the impact of the policy on labour productivity. This uses both cross-sectional analysis and a fixed effects (FE) panel data approach to describe labour productivity before and after the Nitaqat policy over a ten-year period (2005-2015). The results suggest that the private sector has suffered from lower productivity in the short run; forcing the less productive firm to exit the market, while the more productive firms were surviving. Hence, raising labour productivity in the long run.

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Contents

List of Tables

List of Figures

ABBREVIATIONS

GCC	Gulf Cooperation Council
KSA	Kingdom of Saudi Arabia
SAGIA	Saudi Arabian General Investment Authority
GOSI	General Organization for Social Insurance
MOL	Ministry of Labour, Saudi Arabia
MOI	Ministry of Interior, Saudi Arabia
MOP	Ministry of Planning, Saudi Arabia
MOEP	Ministry of Economy and Planning, Saudi Arabia
LFS	Labor Force Survey
AES	Annual Establishment Survey
SAMA	Saudi Arabian Monetary Agency
DID	Difference-in-Differences
FE	Fixed Effect
OLS	Ordinary Least Square
GLS	Generalised Least Square
WLS	Weighted Least Square
PIM	Perpetual Inventory Method
GVA	Gross Value Added
ONS	Office for National Statistics
OECD	Organisation for Economic Co-operation and Development
TFP	Total Factor Productivity

Chapter 1 Introduction

Saudi Arabia is one of the top five countries for labour migration destinations in the world (Laczko and Appave, 2015). In 2009, Saudi Arabia was ranked as the second top remittance-sending country in the world, after the United States (Canuto and Rafha, 2011), with outward remittance reaching around USD 26 billion per year. One of the major challenges facing the labour market in Saudi Arabia is the low share of Saudis in the private sector, the private sector relies heavily on foreign labour, comprising around 90% of workers in the sector. Also Saudi Arabia also has one of the highest youth population growth rates in the world. Therefore, it became imperative to find a solution for employment of the growing youth population entering into the labour force.

The idea of job nationalisation - *'Saudization'* - has been re-occurring in the Saudi labour market since the 1990s when a 20% nationalisation quota was imposed on the private sector. However, these policies were unsuccessful, not only because they were overly ambitious, but also because the government did not enforce their implementation. In 2011, the government introduced a new approach to *Saudization* with its "*Nitaqat*" program. *Nitaqat* was no longer a blanket policy across the private sector but rather, it considered the average share of Saudis in different industries prior to the policy and imposed new nationalisation quotas accordingly. For example, as the construction sector had a low *Saudization* rate – under 3% - the new quota was increased to 5%. In other industries, such as finance, where the *Saudization* figures were higher, the aim was to increase the quota from 50% to 60%. Therefore, the quotas in

this new policy were more attainable across all industries and firm sizes[1].

Hertog (2012) identifies two main goals of labour market policies in Saudi Arabia: firstly, to provide employment to the entire national population, and secondly, to maximise productivity, thus improving economic growth. It is unclear how such a policy would impact on the labour market, as it is not necessarily true that employing nationals would result in increased productivity. In fact, it could have the opposite effect where efforts to raise national employment levels such as *Nitaqat* could result in reduced productivity levels. This thesis will analyse the *Nitaqat* policy in terms of its impacts on labour market as well as productivity.

1.1 Research Aims

The aims of this thesis are to first conduct a quantitative study to analyse the impact of the *Nitaqat* policy on the *Saudization* rate, employment growth, exit rates, and on the behaviour of the private sector in response to the policy - using an original detailed dataset provided by the Ministry of Labor in Saudi Arabia. Secondly, to study individual level trends in earnings, which can proxy for labour productivity, before and after the implementation of *Nitaqat* in relation to skill levels using the General Organization of Social Insurance (GOSI) dataset. Finally, the research aims to link the *Nitaqat* policy to productivity and study how the policy has impacted total factor productivity on the industry level between 2011 and 2015.

[1] A detailed quota table is included in the appendix of Chapter 2.

1.2 Motivation and Research Contributions

The motivation for this research is to explore a new dataset produced by the Ministry of Labor in order to provide, for the first time, an analysis of the impact of *Nitaqat* policy on the labour market of Saudi Arabia and on productivity. *Nitaqat* is one of the world's largest quota-based labour policies as it applies across the whole of the private sector (Peck, 2017). Countries where similar policies have been applied, such as affirmative action in the US, tend to target particular industries rather than all industries. With around 90% foreign employment in the private sector, the *Nitaqat's* main aim is to raise the employment levels of Saudi nationals in the labour market. With strict sanctions imposed on non-compliant firms, the policy has a high compliance rate of 0.2 percentage points for every one percent increase in *Saudization* rate to reach the required quota per firm in 2012 (Peck, 2017). This thesis adopts an econometric approach to study the impact of *Nitaqat* on Saudi and foreign employment, as well as on firm behaviour and exit rates.

Most of the existing literature on *Saudization* is limited to descriptive quantitative analysis and qualitative assessment of future government steps, with a lack of thorough statistical evaluation of these policies. This is mainly due to the lack of micro data in the country, which has made it difficult to evaluate these policies in order to provide a more in-depth analysis. Although this is one of the major limitations faced while conducting this thesis, it is also one of the main areas of contribution as we were able to acquire the original detailed dataset on the whole population of the private sector at the firm level from the Saudi Ministry of Labor on the *Nitaqat* program. This facilitated an econometric approach to evaluate the program, producing original results and conclusions. This research builds on the work of Peck (2017), who analysed the immediate impact of the *Nitaqat* policy on employment and the private

sector in 2012. The investigation of the policy after 2012 allows for an analysis of new data. The research most closely contributes to the literature on positive discrimination, such as affirmative action policies in the US, and other similar policies in different countries around the world. The thesis will also study the impact of *Nitaqat* policy on productivity which, to our knowledge, has never been done before.

1.3 Structure of the Thesis

The thesis is divided into two parts, the first part will focus on presenting the social and economic context of the country and of *Nitaqat* and the second will present, analyse and discuss the results arising from the empirical investigation. Thus, Chapter 2 will provide the historical background of Saudi Arabia and discusses the details of the *Nitaqat* program. Chapter 3 reviews the relevant theoretical and empirical literature and also provides a discussion of the relevant literature from the region.

The second part of the thesis contains the results from the empirical work, from Chapter 4 through 6. Chapter 4 examines the impact of the *Nitaqat* policy on the Saudi labour market, using the *Nitaqat* dataset provided by the Ministry of Labor. The chapter starts by analysing the trends in the dataset using some descriptive statistics to illustrate firm behaviour in the private sector. It then studies the impact of *Nitaqat* using a difference-in-differences technique to measure the causal relationship of the policy on the labour market. In particular, the econometric approach examines the impact on *Saudization* rates, employment rates, and exit rates of firms from 2012 to 2015. With the dual nature of the Saudi labour market, the chapter also considers the different effects on Saudis and non-Saudis in the private sector.

Chapter 5 is a detailed analysis of Earnings in the Saudi private sector labour market, using original data. It studies the nature of the market before and after the *Nitaqat* policy implementation. It uses the GOSI dataset to analyse trends of nationality difference, gender, skills, and industry on hourly wages from 2009 to 2015.

Chapter 6 starts by conducting a growth accounting exercise, using national accounts and the Labour Force Survey, to analyse trends of productivity before and after the implementation of *Nitaqat*. The chapter then utilises an econometric approach using a production function framework to analyse the trend of output per worker before and after the *Nitaqat* policy using the Annual Establishment Survey. Then, it merges the *Nitaqat* dataset and the Annual Establishment Survey to investigate the impact of *Nitaqat* on total factor productivity (TFP).

Chapter 2 Labour Markets in Saudi Arabia

The Saudi economy can be depicted as a classic rentier economy model, characterised by governments who seek rent from natural resources instead of basing their income on taxation, and who distribute income amongst the population as they see fit (Ramady, 2005). An economic rent is received usually by owning natural resources. Therefore, in a general sense a rent exists in all economies, although to different degrees. For an economy to be called rentier, it must fulfil several requirements. First, a rentier economy occurs when the rents are predominant in the economy. Second, since it is assumed that rentier economies are unproductive, the economy relies on sizeable external rents. Third, in rentier states, usually the beneficiary group of this rent is small in comparison to the people involved in its' distribution and utilization. Fourth, in a rentier state the government is usually the recipient of the rent (Beblawi, 1987).

Moreover, according to Beblawi (1987) a rentier state leads to a rentier mentality. In conventional economies, the norm is that individuals receive rewards based on a process of a "long, systematic and organized" production circuit. In a rentier economy this is not the case - the reward has little relation to the work or time invested and more likely an isolated fact based on chance. In the context of the GCC[2] countries, the economy is mainly dependent on external rent through oil revenues. Therefore, this mentality has resulted in a unique labour market. A welfare system has developed where the government is responsible for providing all basic goods and services such as education, health and jobs, as a way of distributing

[2] Gulf Cooperation Council: Saudi Arabia, Kuwait, Bahrain, Oman, UAE, and Qatar.

wealth to the population. Therein lies the root of the problems that the Saudi labour market faces since public sector jobs, with short working hours and job security, are very attractive (Maroun et al., 2008, Al-Kibsi et al., 2015). However, this is not a sustainable solution for wealth distribution. Instead of investing in economic diversification and development, the government created jobs to accommodate the growing labour force resulting in high levels of bureaucracy, job redundancy, low productivity and significant high costs. As a result of this system the private sector has benefited by hiring foreign labour at lower costs, with longer working hours, and low labour restrictive regulations for foreigners (Maroun et al., 2008). With the growing population the government started facing a high unemployment rate since the public sector was saturated and could not accommodate an ever-growing population entering the labour market. Foreign labour reached a high of 90% of private sector employment (SAMA, 2016). The following section will give a brief historical background of the Saudi economy, and in particular of its labour market, and how it reached its current situation.

2.1 Historical Background: Saudi Arabia

The first major oil discovery in Saudi Arabia was in 1939 (MOP, 1980). However, the Second World War limited the development of oil production in Saudi Arabia. In 1945, total revenues of Saudi Arabia were less than USD 4 million per year. In 1949, oil revenues started to contribute to the economy, reaching USD 85 million, which allowed the government to start investing in infrastructure and development projects; such as railways, modern sea ports, schools and colleges. By 1952, 20,000 students were enrolled in formal education at all levels. This was the first oil boom; the production of oil had increased from 1m barrels per

year in 1939, to 60 million barrels in 1947, to 200m barrels in 1951 (MOP, 1980). Between 1953 and 1970, GDP growth averaged 9.5% in real prices. Although the prices were more or less constant, the demand on oil had increased significantly during that period, and production increased at a rate of 9.2% per annum reaching 481m barrels in 1960 (MOP, 1980).

The physical infrastructure of roads and houses was developed at accelerated rates during that time, which also saw increasing development of the health and education sectors. The revenues from the oil boom allowed for the opening of new schools and universities as education attainment levels at the time were low for Saudis. In 1975, the economy was undergoing substantial transformation and development that required a significant and instant increase in the demand for labour, that could not be sufficiently met by the national supply of labour alone. The government had to make a decision to either slowdown these projects due to insufficient manpower or allow foreign labour to assist with the development process. The latter was chosen, and the labour force increased by 41% over a five-year period (MOP, 1980). Furthermore, at the time, the nationals typically entered the labour force at age 12. With the development of the education and training sector, and the availability of resources of foreign labour, Saudis were able to stay longer in the education system. Their share of the national labour force declined from 72% in 1975 to 57% in 1980 across both the public and private sectors (MOP, 1980). This was the result of two factors; the continuing inflow of the foreign labour force, and the decline in the growth of the national workforce as Saudis were encouraged to stay in the education system for longer. The growth of the foreign labour force between 1975 and 1980 was 16.5% per annum, compared with a 2.4% annual growth rate for the Saudi labour force (MOP, 1980). The government started creating public sector jobs for the Saudi labour force as a way of distributing some of the oil wealth, with job security,

higher pay and lower working hours than the private sector (Ramady, 2010, Chaudhry, 1997). Meanwhile, the private sector had access to foreign labour that expected lower wages, as well as being better equipped with better skills for market needs (JP Morgan, 2015). Furthermore, the trend continued, culminating in 90% of the private sector labour force being comprised of foreign labour 1980.

However, during the 1980s, the economy went into a recession with the crash of oil prices and the government turned to public debt to cover its high expenses and subsequently unemployment rates increased. In 1993, the government started its *Saudization* efforts and put pressure on the private sector to reduce foreign labour and hire Saudi nationals (MOEP, 2000). Inward migration reached its lowest point in 1992 as shown in Figure 2.1, illustrating the growth trend of inward migration over time.

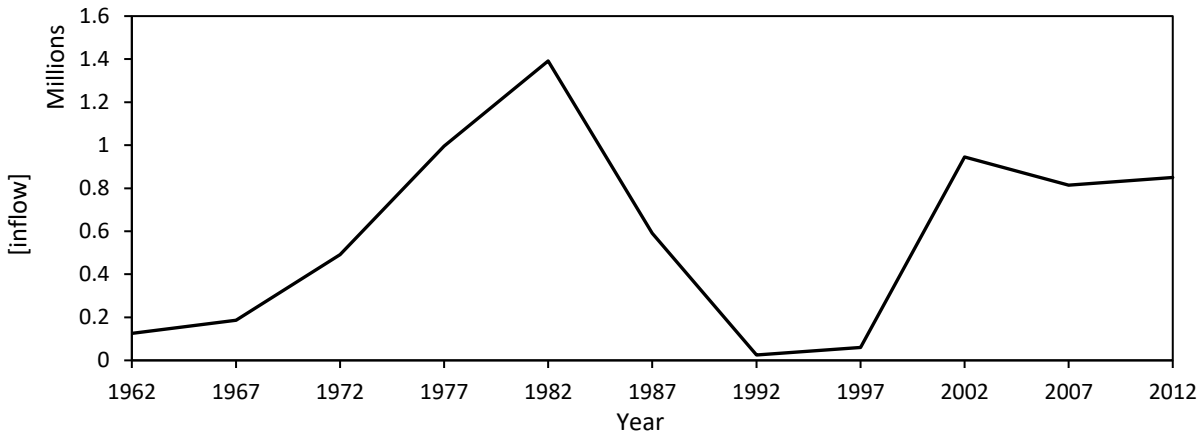


Figure 2.1: Migration inflows to Saudi Arabia over time (World Bank, 2015)

With the oil prices recovering in the early 2000s, growth in inward migration increased again, at a steady rate. Foreign workers tended to send their income back home, resulting in a high outward remittance. Consequently, Saudi Arabia has the second highest outward remittance

level in the world. As of 2015, it is the 4th top country in hosting the largest number of migrants (Laczko and Appave, 2015). According to (Laczko and Appave, 2015), Saudi Arabia is the fourth largest host country of immigrants after the United States, Germany and Russia, with 10m immigrants. It supersedes other developed countries such as the United Kingdom, Canada, France and Australia. In order, the top five countries of origin of immigrants in Saudi Arabia are India, Pakistan, Bangladesh, Egypt and the Philippines (UNICEF, 2014).

As mentioned, the public sector was the target of most national job seekers and the inflow of migrant workers was taken up by the private sector. However, the situation was unsustainable as the public sector could no longer sustain the massive payroll of the labour force, given the considerable growth in the Saudi population where the youth unemployment rate reached 30% in 2011 (see Figure 2.2) as (World Bank, 2015). Since the 1990s there had been a realisation of the importance of investment in local human capital, and promotion of nationalisation programs in the private sector. However, these efforts were ineffective as they placed unreasonable targets on the private sector with minimal consequences for non-compliant firms. However this changed with the introduction of the *Nitaqat* policy.

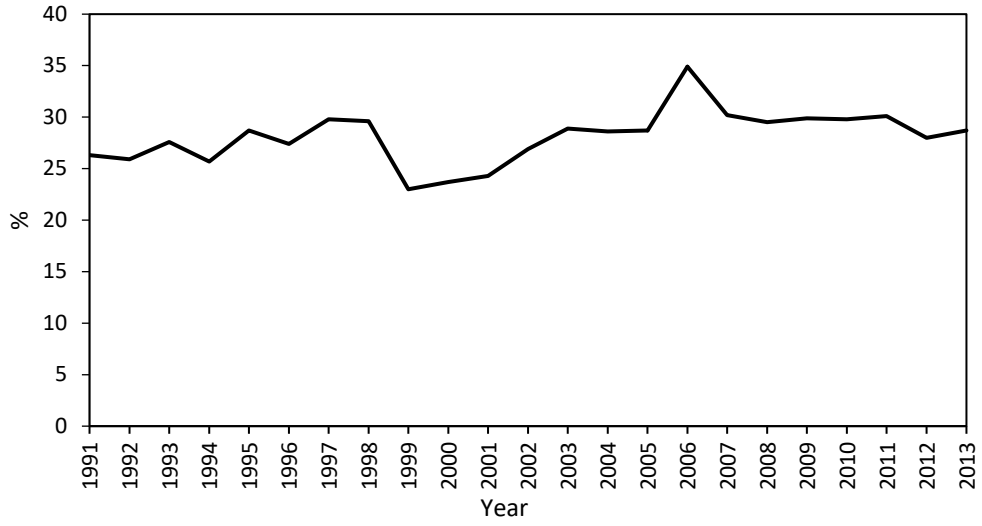


Figure 2.2: Unemployment, youth total. Percentage of total labor force ages 15-24, modeled ILO estimate (World Bank,2015).

A McKinsey & Co. survey found that 57% of graduates take between three months and a year to find their first job in Saudi Arabia. This is longer than many countries in the survey, such as the US, Germany, Turkey and India (Laczko and Appave, 2015). This is supported by the social structure in Saudi Arabia, since parents continue to finance their children's needs until they find employment, allowing recent graduates freedom to be selective in their job choices.

Another challenge in the Saudi labour market is the low female participation rate. Saudi Arabia is ranked 141 of 144 countries for female workforce participation (JP Morgan, 2015) and it is the lowest amongst its close neighbours. The rate of female youth unemployment is 60%, compared to 17% among males. The reason behind the low participation in the labour market, according to the JP Morgan (2015) report, is a combination of social and practical challenges. Firstly, taking into account the social aspect, it is expected that women prioritise their family over their career; therefore, the long working hours deter many from working.

Additionally, according to the study, wives are expected to make sacrifices in order to benefit their husbands' careers. Moreover, with women not allowed to drive, and without a proper infrastructure for public transportation, private transportation can cost up to 50-70% of their monthly income, especially for women only earning minimum wages. However, in line with the Saudi Arabian Vision 2030[3], on September 26th 2017, a royal decree was issued lifting the ban on women driving, which will take effect in June, 2018 (Gardner, 2017). This is a historic moment for female empowerment in Saudi Arabia, and it will be interesting to study the effect of women driving on female employment in Saudi Arabia in the future. According to many academics, such as Fattah (2017), allowing women to drive could have a considerable economic impact. This is because women will have access to more jobs as transportation will be a less significant impediment for women working. Fattah (2017) estimates that this could result in annual GDP growth increases of 0.4% to 0.9% over the next 20 years, which is expected to reach around USD 90 billion by 2030 . Fattah also highlights the challenges that fall on the private sector to create enough jobs to accommodate the massive increase in supply of local female workers. Women driving will be a major contributor to higher female employment in the Saudi labour market, and in terms of the *Nitaqat,* we assume that the private sector will also benefit as the supply of women entering the workforce will increase. Therefore, the challenge of hiring women will decline, resulting in more *Saudization* and an increase in Saudi employment.

Meanwhile, the government has shown interest in feminizing jobs since 2011. A royal decree was announced in 2011 to provide specific jobs for women only, such as segments of the

[3] Vision 2030 is an economic transformation plan to improve economic development of Saudi Arabia and reduce oil-dependency by 2030.

retail industry, manufacturing and pharmaceutical industries. This had the effect of forcing the replacement of foreign workers by females in these industries because it was not allowed for males to hold these jobs anymore due to existing segregation policies in the country. The government also created centers supporting distance working. As shown in Figure 2.3, the number of jobs for Saudi females quadrupled from around 100,000 to 400,000 between 2011 and 2013 (JP Morgan, 2015).

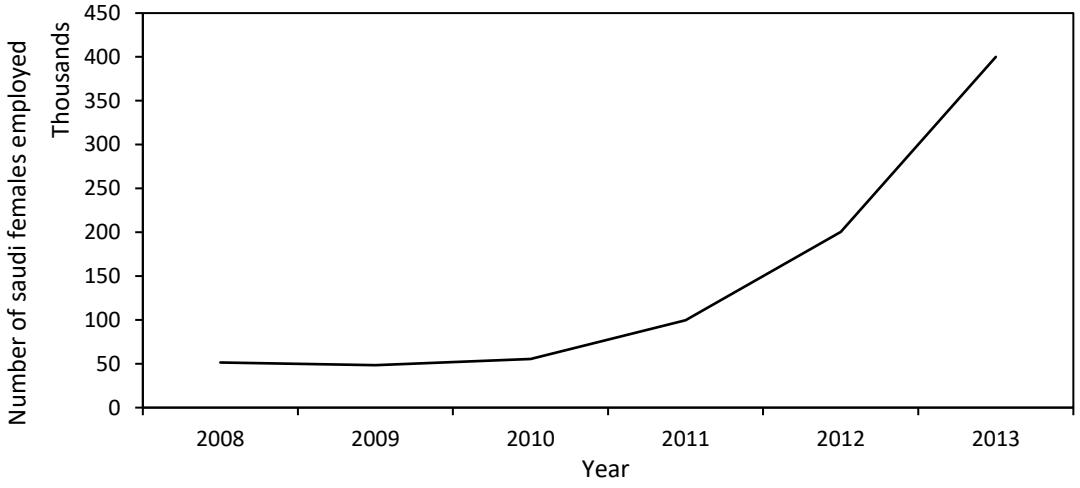


Figure 2.3: Saudi women employed in the private sector

According to Gurrib (2009), total unemployment stayed at around 10% from 2000 until 2009, while female employment jumped from 18% to 28% during the same period. Meanwhile, youth unemployment rates were considerably higher than total unemployment, starting at 20% in 1999 and peaking at 30% in 2006, whereas total unemployment ranges between 8% to 12% during the same period.

2.2 Nationalisation Programs in the Region

2.2.1 Old "*Saudization*" Policy

Governments in the GCC[4] region recognised the problems of unemployment and high foreign labour, and introduced the first nationalisation programs in the private sectors in the 1990s, with the aim of reducing unemployment amongst nationals and dependence on foreign labour. However, up to the 2000s, these programs were narrow and largely unenforced.

Saudi Arabia had two main stages of its nationalisation efforts: 1995-2010 and 2011 to date. The efforts towards "*Saudization*" in 1995-2010 were similar to those of other GCC countries. Industries were categorised (11 in total) with unreasonable targets requiring around 30% Saudi workers for almost all industries. These targets were impossible to meet on a large economic scale. However, efforts achieved some success in the Oil and Gas industries, as well as in the Financial Services industry (MOL, 2015c).

2.2.2 Nitaqat

In 2011, "*Nitaqat*" was introduced by the Ministry of Labor. It had the same aims as previous nationalisation policies, namely to increase employment of Saudi nationals and decrease dependence on foreign workers. However, a fundamental difference was that *Nitaqat*

[4] Gulf Cooperation Council: A political and economic union formed in 1981 by six countries: Saudi Arabia, Kuwait, Bahrain, United Arab Emirates, Oman and Qatar (http://www.gcc-sg.org/en-us/Pages/default.aspx).

introduced a differentiation between industries with different quotas for different industries. Its targets were based on firm size, industry and current level of compliance for each firm in the program. Compliant firms were offered rewards and incentives, such as a larger number of visas for foreign workers, while non-compliant firms faced restrictions on visas and other government services, resulting in some firms exiting their respective markets.

The reason behind the implementation of *Nitaqat* was to provide an effective, transparent policy using an automated tool to ensure fairness and equality (MOL, 2015c). One of the targets of the program is to encourage competition between the private sector in raising their nationalisation levels, thereby reducing unemployment and moving towards sustainable economic development.

The new policy has categorised the industries into 50 industries (MOL, 2015c). Following this, size was taken into consideration where five sizes were allocated for each industry ranging downwards from giant to micro firms. The policy evaluates the performance of enterprises in four categories: Red, Yellow, Green, and Platinum. Each category represents the percentage of Saudi employees in the enterprise. Green and Platinum categories are rewarded for recruiting nationals, whereas Yellow and Red get restricted government services, to a point where they either need to adhere to the program and improve their colour band or face sanctions that could lead to adverse effects in the economy. The purpose of the program was to reduce the level of unemployment in the country, through motivating companies to employ nationals. In total this resulted in roughly 1,000 different quotas based

on industry, size, and colour categorisation of the firm[5].

As a result of the high compliance rate, by 2013 the Green band had a high percentage of firms so policymakers decided to raise the efficiency of the program and subcategorise the Green band into three further classes: Green High, Green Medium and Green Low. However, for reasons of consistency from 2011 to 2015, in this thesis we continue to treat it as one band. Furthermore, in 2013, micro firms with 10 employees or less were also included in the program, but in special categories, the Red Micro and the Green Micro bands. This required the Saudi business owner to register as an employee to comply with the quota and be included in the Green Micro band as compliant firms, with the condition that the business owner cannot be registered as an employee in another firm.

The main difference between this policy and previous efforts towards nationalisation is the detailed quotas imposed in the program. As stated earlier, *Saudization* efforts previously required a minimum of 20-30% *Saudization*, regardless of industry or size. Many firms could not comply and there were minimal sanctions for non-compliance. This time, the policy took into account each industry and its size, which made compliance more realistic. For example, the construction industry is an unattractive job prospect for many Saudi men, and therefore has a high percentage of unskilled foreign workers. Hence, it was unlikely to be able to comply with a 20-25% *Saudization* quota, so a more reasonable *Nitaqat* quota of 5-7% was enforced for the firm to be compliant.

[5] See Appendix 2.A

The Saudi government was aware that the private sector was the only viable solution to the rising unemployment in Saudi Arabia in the long run, despite the reluctance of the private sector especially considering the added costs they would face. With the introduction of *Nitaqat*, the government offered incentives for the private sector if it complied, since their reliance on foreign labour was very high. The majority of foreign workers at the time were unskilled, low wage-level workers, whereas Saudis were costlier to employ. The policy is advanced and unparalleled in detail and scope, in addition to its strict implementation and monitoring[6]. Therefore, the program is a perfect case study to measure the effectiveness of such programs in combating unemployment.

Nitaqat Stages

The policy went through three stages (MOL, 2015b):

Nitaqat One: Focused on raising the *Saudization* rates through eliminating obstacles against hiring Saudis. One such obstacle is the higher wage of the Saudi national as most foreigners in the private sector are low-skilled, low-wage workers. Through the Human Resource Development Fund (HRDF) the Ministry offers to pay certain percentages of the wage of Saudis in compliant firms to lessen the sudden high cost on firms. This would last from two to five years.

Nitaqat Two: Focused on solving the problem of low wages of Saudis in the private sector. The policy introduced a minimum wage of 3,000 Saudi Riyal (800 USD) per month to count

[6] Details of the sanctions and rewards are given in Appendix 2.A, Figures 2-4, 2-5,2-6,2-7.

the employee as one whole employee in the system. If their wage was less than 1,500 SAR (400 USD) per month (Sargent and Rodriguez, 2001) the employee will not be counted in the system at all. If the wage was between (1,500-2,999 SAR) (400-799 USD) per month, then they will be counted as half of one Saudi employee. Therefore, although the minimum wage is not mandatory for firms, in practice offering lower than 3,000 SAR would impact their *Saudization* quota. Meanwhile, the average wage of the foreign worker is around 1,500 SAR (400 USD) per month, which is half the cost of the Saudi worker. In 2012, the Ministry added an extra cost of 2,400 SAR per year (640 USD) on every foreign employee exceeding the number of Saudi employees. These charges were an effort to reduce the cost gap between Saudis and workers from overseas. This stage also focused on increasing the female participation rate in the labour market by loosening the strict regulations against female employment in the workplace. By the end of 2011, the Ministry of Labor added a requirement to specific industries, such as the retail industry, to employ more females.

Nitaqat Three: In 2014, the addition of micro-sized firms, those that have ten employees or less, led the government to allow the Saudi business owner to register as an employee of the firm to adhere to the required quota. Another change in the third stage of *Nitaqat* was the ability of firms to pay the Ministry of Labor directly to raise their quota level. This was introduced due to the strict sanctions of the policy if the firm fell behind the required quota even by one Saudi employee. It allowed for a quick fix for firms to pay the Ministry to remove the sanctions and continue to operate in the market. These fees go to the Human Resource Development Fund (HRDF) that pays part of the wages of Saudi employees in compliant firms. However, it is still encouraged to hire Saudis instead of paying these fees, as they are higher than the wage of an employee in the long run.

Mechanism of Nitaqat

The *Nitaqat* system relies on a 13-week moving average. This is the mechanism whereby a Saudi employee is added to the nationalisation count in the firm. The *Saudization* percentage is taken for the first week. For the second week, the program counts the average for the two weeks, and so on until it reaches the 13-week mark (MOL, 2015b). Therefore, the single Saudi employee will be counted as a third of an employee in the first month, two thirds of an employee in the second month and a full Saudi employee in the third month, which is when the system is updated. The reason behind this method is to ensure the actual employment of the Saudi citizen (Alonazy, 2012). Under Saudi labour laws, Saudi employees cannot be dismissed after three months; therefore, employers began to recruit them on temporary, probationary, 3-month contracts, which they had the option to renew or not. Firms found a way to side-step this rule, by increasing the numbers to meet the criteria by hiring and then firing immediately after. Thus, under the *Nitaqat* policy the Saudi worker is not fully included in the system under the firm until 13 weeks after the recruitment date.

Saudis working in the private sector suffer as a result of low wages; therefore, the MOL decided to modify the calculation for Saudi employees, adding a wage variable into the equation in the first quarter of 2013. As explained earlier in the second stage of *Nitaqat*, if the wage is less than 1,500 SAR (400 USD) per month, the program will not count it as an additional hire. With 1,500 SAR, the employee will be counted as half a Saudi citizen, going up to 3,000 SAR for a full Saudi employee as counted in the *Nitaqat* system. That said, there is no direct penalty for not complying with the minimum wage, but the firm will not receive the benefits or incentives that follow the suggested minimum wage (Aljabreel, 2012).

Alhumaidan (2014) explains the challenges the Ministry of Labor encountered to enforce a

minimum wage for Saudi employees, and to raise the level of competitiveness between them and workers from overseas. Some of the ways in which the MOL helped the private sector to accommodate the extra cost was by paying a certain percentage of the wage through the HRDF, which could reach up to 50%, for up to two years from recruitment, if the firm was in the Green colour. And for Platinum colour firms it could continue for up to three or five years.

The policy also goes into detail on how to count "special cases" in the Saudi labour force in the *Nitaqat* equation. For example, Saudi students *cannot* be more than 10% of the total number of Saudis per firm. Moreover, workers with disabilities are counted as four Saudi employees, as a way to motivate firms into recruiting them, making them a productive part of society. If the number of disabled employees exceeds 10% of the total number, they will be counted as one Saudi employee rather than four. Furthermore, the ministry also takes into account the number of ex-convicts that were released in the previous two years. Because of their difficulties in finding jobs in the labour market, they are counted as two Saudi employees in an effort to encourage the private sector into recruiting them. After two years they will go back to being counted as a single employee again (Ramady, 2012).

The policy works with entities rather than establishments: for example, if an establishment has two entities in different industries, such as transportation and retail, then the ministry would treat them as two separate entities regardless of their shared establishment name or number. However, if those entities were all within one industry then they would be treated as one. Every entity of the same size and industry is rated according to a quota measured by its ability to adhere to the S*audization* quota. As mentioned earlier, for example, the construction industry has a quota range of 5-7%, whereas industries such as financial institutions or

petroleum have a range between 30-65%. Based on these quotas, the entity is ranked under one of the four colour categories: Red, Yellow, Green and Platinum. The lowest nationalisation percentage would be in the Red category; the Yellow category means that the entity has met some of the requirements, but still not the required quota. Entities meeting the minimum quota move to Green and Platinum

Nitaqat Debates

After creating the *Nitaqat* program, a major challenge was to ensure that both the private sector, as well as the labour force, benefitted from it. *Saudization* programs are argued to be profitable for the private sector in the long-term (Fakeeh, 2009) since the income the Saudi employee receives will be spent on the economy, instead of being sent as outward remittance, which encourages the economic cycle and hence, economic growth.

Furthermore, with the current wage gap between Saudis and non-Saudis, it was vital to complement nationalisation efforts with higher productivity and a better education system (Fayad, 2012). Both private sector and foreign workers greeted the introduction of *Nitaqat* with panic and alarm, especially since the Ministry of Labor had issued a statement saying that half of private sector firms would be categorised as either Red or Yellow (Wahab, 2011). In 2013, the policy added a fee of (2,400 SAR) per foreign worker per year. The private sector filed lawsuits against the Ministry of Labor for the severe cost that *Nitaqat* has imposed on their firms. Although it has been argued that high unemployment can cause higher crime rates and low productivity, the private sector is the indicator of prosperity and productivity in an economy; and productivity increases by employing the best fit to the job which then allows for higher economic returns (Abu Talib, 2011). Alqusaibi (2008) argues that the *Saudization* process should not be imposed at the expense of productivity and

economic efficiency. Moreover, there is a necessity to improve education and training programs simultaneously[7], to produce a qualified and competitive labour force, equipped to face the demands of the labour market.

According to Faqeeh and Aljabreel (2012), the difference between old nationalisation policies and *Nitaqat* is that the latter has taken into consideration the needs of each industry and its size, and has introduced reasonable quotas accordingly. This makes the policy more attainable and applicable. "It is not our goal to hurt the private sector; the goal is to help it grow sustainably" (Faqeeh, 2012). Furthermore, the fact that the system is automated allows for more equality between firms in the private sector and adds a level of fair competitiveness.

There are a number of reasons why the private sector had been reluctant to employ Saudis, the first of which was the higher labour cost. As indicated earlier, there is a considerable wage gap between Saudis and foreign workers, especially in low-skilled jobs. Secondly, cultural and social perceptions need to be taken into consideration. Many jobs are unacceptable to Saudi workers because of impacts on their marriage and other social relations, leading to employer / employee problems. Moreover, foreign workers are used to short-term contracts (Ramady, 2013).

Saudi employers and employees were used to a system of hiring and firing up until 2016, when the system changed. The old system prohibited the firing of any Saudi employee unless they refrain from attending work for 15 days consecutively (MOL, 2015a). If fired for other

[7] In 2008, the government started an international scholarship for hundreds of thousands of Saudis to study abroad as an investment in human capital.

reasons, the firm may need to pay high settlements or fines. Hence, this is another reason the private sector favours employing foreigners.

One of the major challenges the Ministry faced after the implementation of *Nitaqat* and the harsh quotas on the private sector is the emergence of "Phantom Employment". This is where firms hire Saudis by name and social security numbers without them physically coming to work since the skills needed in the private sector are different from those supplied by the majority of the Saudi labour force. The MOL is aware of masked employment that results from *Saudization;* however, they have introduced sanctions for firms that have resorted to such measures to maintain their quotas. Sanctions could be in the form of a revocation of their permission to issue visas for more overseas workers, or fines of up to 25,000 SAR (6,666 USD) per employee (Althumairy, 2016). In addition, it is argued that the reward program defeats the purpose of the *Nitaqat* policy, as compliant firms are rewarded by the ability to purchase more work 'Visas' for foreign labour to come into the country. Offering more visas will not help solve the problem of the reliance on foreign labour. However, policy makers claim that compliant firms could also benefit from the foreign labour that already exists in the country, rather than bringing in new foreign workers.

2.2.3 The Impact of *Nitaqat* Policy in the Local Market

Saudi Employment

According to Alhumaidan (2012), the nationalisation of jobs in the private sector reached 15.15% in 2013; up from 9.9% in 2009. The number of Saudi employees also rose, reaching 1.5 million in 2013, in comparison with 681,500 prior to *Nitaqat*. As shown later in Chapter 4 this was a one-off gain with flat employment growth thereafter. According to the annual

statistics of the Ministry of Labor in Saudi Arabia (2015), Saudi male employment increased right after the implementation of *Nitaqat*. We are interested in studying whether there was a lasting effect or just a one-time rise.

Female Employment

The challenge of employing women is to provide an environment that adheres to Saudi labour law, which allocates males and females to separate working places. Then, there was the need to provide a means of transportation or compensation for transportation costs, and that was a problem for many firms. Moreover, the segregation regulation in the manufacturing industry would have made it difficult to transfer knowledge from a currently male-dominated industry to accommodate female workers. The government has contributed to training females for the job market through the HRDF (Alhilali, 2011).

The manufacturing industry is one of the biggest industries in the Saudi economy and 88% of jobs in the industry in 2011 were filled by foreign workers. This industry could be a major employer for women. Saudi females constituted around 3% of the workforce in the construction industry (120,000 females). Female employment has increased across many different industries, and over 477,000 female employees were registered with the General Organization for Social Insurance (GOSI) by the third quarter of 2015. In heavy duty industries, women were performing managerial and administrative work as a way to increase the *Saudization* percentage for these firms (Althumairy, 2016).

Private Sector

Firms faced increasing costs applying the *Nitaqat* program, and this resulted in a higher exit rate and declining total employment in the remaining firms, as analysed by Peck (2017). The main concern about quota-based labour policies is the trade-off between the costs and benefits. Previous research suggests ambiguous results about the efficiency of such policies (Holzer & Neumark, 2000). Hence, it is vital to produce empirical evidence to measure the impact of such policies.

As the national policy was applied to all firms in the private sector with ten or more employees, this makes it one of the largest quota programs in the world. The nature of the application with automated sanctions for non-compliant firms is also interesting to study further. Many challenges to the Saudi economy, and the private sector in particular, have been encountered since the implementation of *Nitaqat,* especially the falling oil prices after 2015. Most industries recorded losses on the Saudi stock exchange in 2016, apart from the petrochemical, insurance, energy and communication industries. 37% of private sector companies have announced losses, and average firm profits declined by 46%. Only 17% of private sector firms recorded positive growth in 2016. Moreover, higher operating costs and a reduction in buying power in the country had a negative impact on the competitive advantage of Saudi firms, especially with the fall in energy subsidies and the rising cost of overseas workers.

2.3 Summary

The Saudi labour market has unique features. The oil boom of the 1970s raised the demand for labour that local supply could not meet. High migration inflow was the immediate option to support the fast economic growth of the country. A dual labour market has become more evident in later years with nationals preferring to work in the public sector since it offers good pay and shorter working hours alongside high job security. Meanwhile, the private sector has resorted to employing the high immigration inflow as it mostly consists of low-skilled, cheaper labour, working longer hours than their counterparts in the public sector. However, with time, the public sector could no longer continue hiring the consistently increasing national labour force, leading to high unemployment rates. To solve the ever-increasing problem of national unemployment, the government issued several job nationalisation programs to encourage the private sector into hiring more nationals. These programs were very ambitious and not enforceable, hence having minimal effects on the private sector and employment. In 2011, the *Nitaqat* program was issued, with four colour bands representing the compliance rate of firms, using a quota-based system that is cross-classified across industries and sizes. *Nitaqat's* strict regulations and applicability to the private sector made its impact highly debatable. This research aims to study the effects of the *Nitaqat* policy on the labour market and productivity using an econometric approach.

2.A Appendix

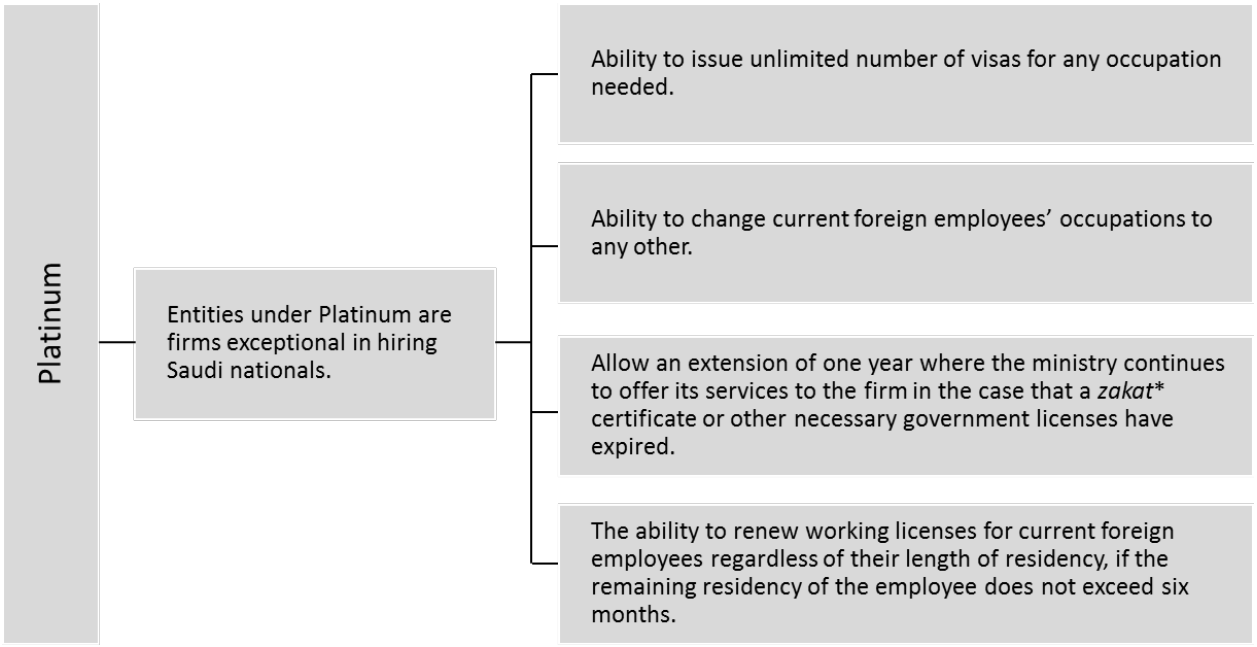


Figure 2.4: Platinum colour, definition, and rewards (MOL, 2015b).

*Zakat is based on Islamic concepts; it is applicable to the ownership in a KSA company by nationals of KSA or other GCC countries. It is assessed at 2.5% of net wealth in a KSA company MOL 2015a. Labor Law Regulations. Riyadh, Saudi Arabia: Ministry of Labor.

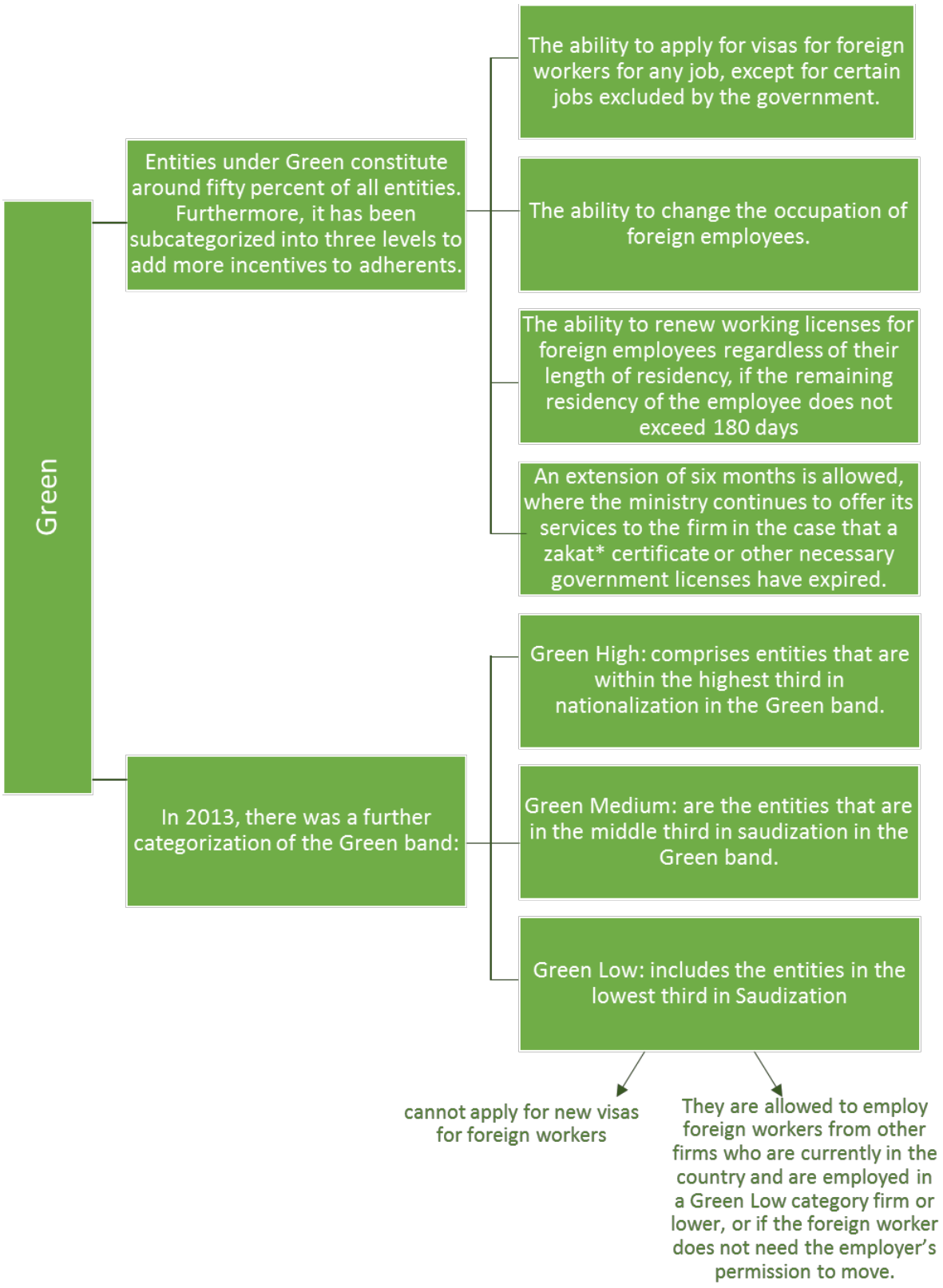


Figure 2.5: Green colour, definitions, and rewards (MOL, 2015b).

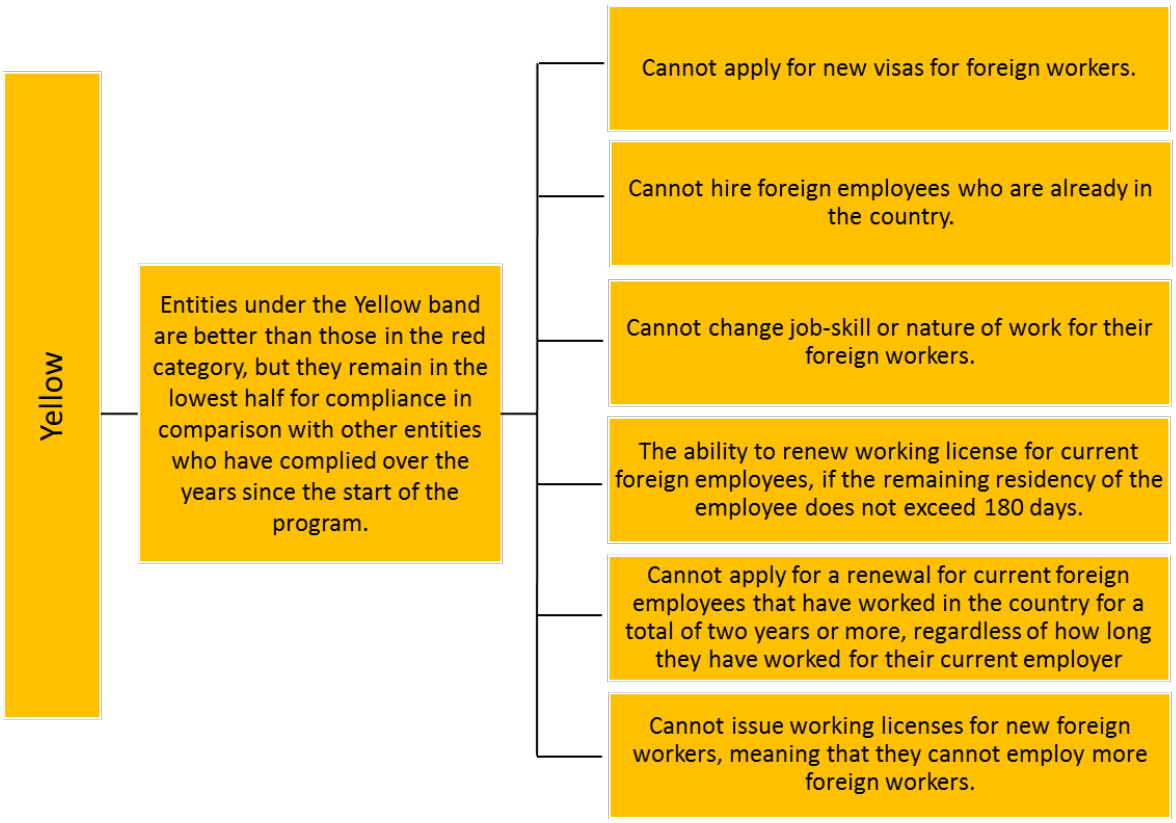


Figure 2.6: Yellow colour, definition, rewards and sanctions (MOL, 2015b).

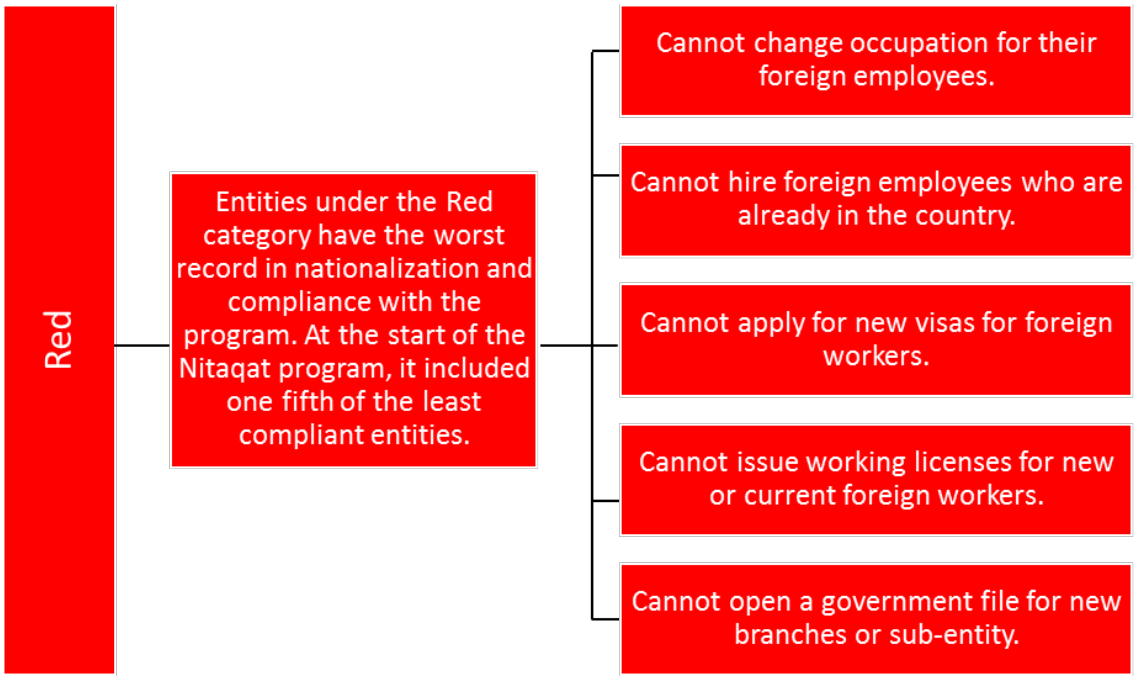


Figure 2.7: Red colour, definition, and sanctions (MOL, 2015b).

Table 2.1: Stakeholders and benefits of Nitaqat (MOL, 2015b)

The Stakeholder	***The Benefit***
Job seekers	Provision of more opportunities for Saudis, since the only way to comply is to recruit more Saudis. Reduction of the competitive advantage of foreign workers in obtaining jobs through adding extra cost on visas, hence reducing the cost gap between Saudis and foreigners by making overseas workers more expensive. Motivation of firms to invest in local human resources to find high value jobs acceptable to Saudi workers. Guarantee of the rights of employees through registering in the Saudi Arabian General Investment Authority (SAGIA). Helping foreign workers to move to high compliance firms who provide a better working environment in compliance with the rules and regulations of the Ministry of Labor.
Business owners or employers	The program uses reasonable evaluation criteria based on the current market, especially taking into consideration the industry and size of each firm. It facilitates employing foreign workers in compliant firms that fall under the Green and Platinum bands, through catering for existing foreign workers who already have local experience in the market. The enforced quotas are based on studies of *Saudization* percentages of firms similar in size and industry in the private sector, therefore providing equality in the program. Better government services for compliant firms. Increased transparency; as the program is automated, the rewards and sanctions are based solely on compliance level.
Society	The program promises to increase economic growth. It will not impose restrictions on compliant firms, which could help to promote firms and economic growth. Lower levels of unemployment, which should result in higher GDP per capita and greater purchasing power.

Table 2.2: Nationalisation quotas for *Nitaqat* based on industry, size and colour band (Translated from the Nitaqat Manual (MOL, 2015b))

Activity	Size			Red		Yellow		Low Green		Medium Green		High Green		Platinum
1- Agriculture, Fishing & Horse Grazing	Small	10	49	0%	1%	2%	4%	5%	11%	12%	18%	19%	24%	25%
	Middle	50	499	0%	1%	2%	5%	6%	12%	13%	19%	20%	26%	27%
	Large	500	2999	0%	4%	5%	13%	14%	17%	18%	21%	22%	26%	27%
	Mega	3000	-	0%	4%	5%	13%	14%	17%	18%	21%	22%	26%	27%
2- Agriculture & Livestock Production	Small	10	49	0%	1%	2%	4%	5%	11%	12%	18%	19%	24%	25%
	Middle	50	499	0%	3%	4%	7%	8%	13%	14%	19%	20%	26%	27%
	Large	500	2999	0%	5%	6%	9%	10%	15%	16%	21%	22%	26%	27%
	Mega	3000	-	0%	5%	6%	9%	10%	15%	16%	21%	22%	26%	27%
3- Oil & Gas Extraction	Small	10	49	0%	4%	5%	9%	10%	24%	25%	39%	40%	54%	55%
	Middle	50	499	0%	9%	10%	29%	30%	46%	47%	63%	64%	79%	80%
	Large	500	2999	0%	14%	15%	34%	35%	51%	52%	68%	69%	84%	85%
	Mega	3000	-	0%	14%	15%	34%	35%	51%	52%	68%	69%	84%	85%
4- Mines & Quarries	Small	10	49	0%	2%	3%	4%	5%	12%	13%	20%	21%	29%	30%
	Middle	50	499	0%	5%	6%	19%	20%	27%	28%	35%	36%	44%	45%
	Large	500	2999	0%	9%	10%	29%	30%	39%	40%	49%	50%	59%	60%
	Mega	3000	-	0%	9%	10%	29%	30%	39%	40%	49%	50%	59%	60%
5- Manufacturing	Small	10	49	0%	4%	5%	7%	8%	13%	14%	19%	20%	24%	25%
	Middle	50	499	0%	5%	6%	14%	15%	19%	20%	24%	25%	29%	30%
	Large	500	2999	0%	7%	8%	19%	20%	24%	25%	29%	30%	34%	35%
	Mega	3000	-	0%	7%	8%	19%	20%	24%	25%	29%	30%	34%	35%
6- Petrochemical, Coal & Rubber	Small	10	49	0%	4%	5%	9%	10%	16%	17%	23%	24%	30%	31%
	Middle	50	499	0%	7%	8%	24%	25%	30%	31%	46%	47%	44%	45%
	Large	500	2999	0%	19%	20%	44%	45%	56%	57%	68%	69%	79%	80%
	Mega	3000	-	0%	19%	20%	44%	45%	56%	57%	68%	69%	79%	80%
7- Cement Industry	Small	10	49	0%	4%	5%	14%	15%	19%	20%	24%	25%	29%	30%
	Middle	50	499	0%	5%	6%	24%	25%	29%	30%	34%	35%	39%	40%
	Large	500	2999	0%	7%	8%	29%	30%	39%	40%	49%	50%	59%	60%
	Mega	3000	-	0%	7%	8%	29%	30%	39%	40%	49%	50%	59%	60%
8- Electricity, Gas & Water	Small	10	49	0%	4%	5%	9%	10%	16%	17%	22%	23%	29%	30%
	Middle	50	499	0%	5%	6%	14%	15%	30%	31%	47%	48%	63%	64%
	Large	500	2999	0%	7%	8%	19%	20%	36%	37%	53%	54%	69%	70%
	Mega	3000	-	0%	7%	8%	19%	20%	36%	37%	53%	54%	69%	70%
9- Building Materials & Construction	Small	10	49	0%	1%	2%	4%	5%	9%	10%	14%	15%	20%	21%
	Middle	50	499	0%	1%	2%	5%	6%	8%	9%	11%	12%	15%	16%
	Large	500	2999	0%	3%	4%	5%	6%	8%	9%	11%	12%	15%	16%
	Mega	3000	-	0%	4%	5%	6%	7%	8%	9%	10%	11%	13%	14%
10- Construction Maintenance &	Small	10	49	0%	1%	2%	4%	5%	11%	12%	18%	19%	24%	25%
	Middle	50	499	0%	2%	3%	5%	6%	13%	13%	19%	20%	27%	28%

Hygiene, employment & Subsistence	Large	500	2999	0%	3%	4%	6%	7%	14%	15%	22%	23%	30%	31%
	Mega	3000	-	0%	3%	4%	6%	7%	14%	15%	22%	23%	30%	31%
11- Wholesale &Retail Trade	Small	10	49	0%	4%	5%	9%	10%	15%	16%	21%	22%	26%	27%
	Middle	50	499	0%	4%	5%	16%	17%	22%	23%	28%	29%	33%	34%
	Large	500	2999	0%	9%	10%	23%	24%	27%	28%	31%	32%	34%	35%
	Mega	3000	-	0%	9%	10%	23%	24%	27%	28%	31%	32%	34%	35%
12- Trade Gold & Jewellery	Small	10	49	0%	9%	10%	14%	15%	27%	28%	40%	41%	54%	55%
	Middle	50	499	0%	9%	10%	19%	20%	32%	33%	45%	46%	59%	60%
	Large	500	2999	0%	9%	10%	28%	29%	38%	39%	48%	49%	59%	60%
	Mega	3000	-	0%	9%	10%	28%	29%	38%	39%	48%	49%	59%	60%
13- Pharmacies	Small	10	49	0%	4%	5%	6%	7%	10%	11%	14%	15%	19%	20%
	Middle	50	499	0%	5%	6%	12%	13%	18%	19%	24%	25%	29%	30%
	Large	500	2999	0%	9%	10%	14%	15%	19%	20%	24%	25%	29%	30%
	Mega	3000	-	0%	9%	10%	14%	15%	19%	20%	24%	25%	29%	30%
14- Catering Services	Small	10	49	0%	1%	2%	4%	5%	11%	12%	18%	19%	24%	25%
	Middle	50	499	0%	1%	2%	6%	7%	13%	14%	20%	21%	27%	28%
	Large	500	2999	0%	4%	5%	15%	16%	20%	21%	25%	26%	30%	31%
	Mega	3000	-	0%	4%	5%	15%	16%	20%	21%	25%	26%	30%	31%
15- Entertainment & Tourism	Small	10	49	0%	1%	2%	5%	6%	12%	13%	19%	20%	26%	27%
	Middle	50	499	0%	4%	5%	17%	18%	24%	25%	31%	32%	39%	40%
	Large	500	2999	0%	5%	6%	17%	18%	25%	26%	33%	34%	41%	42%
	Mega	3000	-	0%	5%	6%	17%	18%	25%	26%	33%	34%	41%	42%
16- Transport of Passengers outside Cities	Small	10	49	0%	0%	1%	4%	5%	9%	10%	14%	15%	19%	20%
	Middle	50	499	0%	4%	5%	8%	9%	13%	14%	18%	19%	24%	25%
	Large	500	2999	0%	4%	5%	9%	10%	19%	20%	29%	30%	39%	40%
	Mega	3000	-	0%	4%	5%	9%	10%	19%	20%	29%	30%	39%	40%
17- Land Transport of Passengers	Small	10	49	0%	4%	5%	11%	12%	19%	20%	27%	28%	34%	35%
	Middle	50	499	0%	4%	5%	11%	12%	20%	21%	29%	30%	39%	40%
	Large	500	2999	0%	4%	5%	11%	12%	22%	23%	33%	34%	44%	45%
	Mega	3000	-	0%	4%	5%	11%	12%	22%	23%	33%	34%	44%	45%
18- Road Transport of Goods within Cities	Small	10	49	0%	5%	6%	9%	10%	12%	13%	15%	16%	19%	20%
	Middle	50	499	0%	6%	7%	10%	11%	13%	14%	16%	17%	20%	21%
	Large	500	2999	0%	7%	8%	11%	12%	14%	15%	17%	18%	21%	22%
	Mega	3000	-	0%	7%	8%	11%	12%	14%	15%	17%	18%	21%	22%
19- Shipping	Small	10	49	0%	5%	6%	17%	18%	33%	34%	49%	50%	64%	65%
	Middle	50	499	0%	9%	10%	24%	25%	39%	40%	54%	55%	69%	70%
	Large	500	2999	0%	9%	10%	24%	25%	41%	42%	58%	59%	74%	75%
	Mega	3000	-	0%	9%	10%	24%	25%	41%	42%	58%	59%	74%	75%
20- Storage	Small	10	49	0%	4%	5%	7%	8%	14%	15%	21%	22%	29%	30%
	Middle	50	499	0%	9%	10%	19%	20%	26%	27%	33%	34%	39%	40%
	Large	500	2999	0%	9%	10%	29%	30%	34%	35%	39%	40%	44%	45%
	Mega	3000	-	0%	9%	10%	29%	30%	34%	35%	39%	40%	44%	45%

21- Air Transport	Small	10	49	0%	6%	7%	19%	20%	32%	33%	45%	46%	59%	60%
	Middle	50	499	0%	8%	9%	24%	25%	36%	37%	48%	49%	59%	60%
	Large	500	2999	0%	9%	10%	29%	30%	39%	40%	49%	50%	59%	60%
	Mega	3000	-	0%	9%	10%	29%	30%	39%	40%	49%	50%	59%	60%
22- Communications	Small	10	49	0%	6%	7%	19%	20%	32%	33%	45%	46%	59%	60%
	Middle	50	499	0%	9%	10%	29%	30%	42%	43%	55%	56%	69%	70%
	Large	500	2999	0%	9%	10%	29%	30%	44%	45%	59%	60%	74%	75%
	Mega	3000	-	0%	9%	10%	29%	30%	44%	45%	59%	60%	74%	75%
23- Insurance & Business Services	Small	10	49	0%	4%	5%	9%	10%	19%	20%	29%	30%	39%	40%
	Middle	50	499	0%	4%	5%	19%	20%	31%	32%	43%	44%	54%	55%
	Large	500	2999	0%	4%	5%	19%	20%	31%	32%	43%	44%	54%	55%
	Mega	3000	-	0%	4%	5%	19%	20%	31%	32%	43%	44%	54%	55%
24- Financial Institutions	Small	10	49	0%	9%	10%	29%	30%	46%	47%	63%	64%	79%	80%
	Middle	50	499	0%	19%	20%	49%	50%	62%	63%	75%	76%	90%	90%
	Large	500	2999	0%	49%	50%	64%	65%	72%	73%	80%	81%	90%	90%
	Mega	3000	-	0%	49%	50%	64%	65%	72%	73%	80%	81%	90%	90%
25- Collection Offices & Real Estate Services	Small	10	49	0%	4%	5%	17%	18%	31%	32%	45%	46%	59%	60%
	Middle	50	499	0%	4%	5%	17%	18%	31%	32%	45%	46%	59%	60%
	Large	500	2999	0%	4%	5%	17%	18%	31%	32%	45%	46%	59%	60%
	Mega	3000	-	0%	4%	5%	17%	18%	31%	32%	45%	46%	59%	60%
26- Consulting Services & Business	Small	10	49	0%	4%	5%	9%	10%	19%	20%	29%	30%	39%	40%
	Middle	50	499	0%	5%	6%	11%	12%	20%	21%	29%	30%	39%	40%
	Large	500	2999	0%	6%	7%	11%	12%	20%	21%	29%	30%	39%	40%
	Mega	3000	-	0%	6%	7%	11%	12%	20%	21%	29%	30%	39%	40%
27- Social & Community Services	Small	10	49	0%	1%	2%	4%	5%	16%	17%	28%	29%	39%	40%
	Middle	50	499	0%	4%	5%	16%	17%	32%	33%	48%	49%	64%	65%
	Large	500	2999	0%	9%	10%	21%	22%	39%	40%	57%	58%	74%	75%
	Mega	3000	-	0%	9%	10%	21%	22%	39%	40%	57%	58%	74%	75%
28- Offices & Public Services	Small	10	49	0%	9%	10%	29%	30%	49%	50%	69%	70%	89%	90%
	Middle	50	499	0%	9%	10%	29%	30%	49%	50%	69%	70%	89%	90%
	Large	500	2999	0%	9%	10%	29%	30%	49%	50%	69%	70%	89%	90%
	Mega	3000	-	0%	9%	10%	29%	30%	49%	50%	69%	70%	89%	90%
29- Agents of Private Recruitment	Small	10	49	0%	9%	10%	29%	30%	49%	50%	69%	70%	89%	90%
	Middle	50	499	0%	9%	10%	29%	30%	49%	50%	69%	70%	89%	90%
	Large	500	2999	0%	9%	10%	29%	30%	49%	50%	69%	70%	89%	90%
	Mega	3000	-	0%	9%	10%	29%	30%	49%	50%	69%	70%	89%	90%
30- Personal Services	Small	10	49	0%	1%	2%	6%	7%	14%	15%	21%	22%	29%	30%
	Middle	50	499	0%	4%	5%	12%	13%	29%	30%	46%	47%	64%	65%
	Large	500	2999	0%	4%	5%	12%	13%	29%	30%	46%	47%	64%	65%
	Mega	3000	-	0%	4%	5%	12%	13%	29%	30%	46%	47%	64%	65%
31- Workshops & Maintenance Shops	Small	10	49	0%	1%	2%	4%	5%	12%	13%	20%	21%	29%	30%
	Middle	50	499	0%	2%	3%	6%	7%	15%	16%	24%	25%	34%	35%

	Large	500	2999	0%	6%	7%	8%	9%	12%	13%	16%	17%	19%	20%
	Mega	3000	-	0%	6%	7%	8%	9%	12%	13%	16%	17%	19%	20%
32- Printing, Publishing & Media	Small	10	49	0%	1%	2%	9%	10%	17%	18%	25%	26%	34%	35%
	Middle	50	499	0%	9%	10%	19%	20%	26%	27%	33%	34%	39%	40%
	Large	500	2999	0%	14%	15%	34%	35%	44%	45%	54%	55%	64%	65%
	Mega	3000	-	0%	14%	15%	34%	35%	44%	45%	54%	55%	64%	65%
33- Laboratory	Small	10	49	0%	9%	10%	14%	15%	19%	20%	24%	25%	29%	30%
	Middle	50	499	0%	10%	11%	15%	16%	20%	21%	25%	26%	30%	31%
	Large	500	2999	0%	11%	12%	16%	17%	21%	22%	26%	27%	31%	32%
	Mega	3000	-	0%	11%	12%	16%	17%	21%	22%	26%	27%	31%	32%
34- Health Services	Small	10	49	0%	4%	5%	13%	14%	18%	19%	23%	24%	29%	30%
	Middle	50	499	0%	9%	10%	15%	16%	20%	21%	25%	26%	29%	30%
	Large	500	2999	0%	9%	10%	19%	20%	24%	25%	29%	30%	34%	35%
	Mega	3000	-	0%	9%	10%	19%	20%	24%	25%	29%	30%	34%	35%
35- Institutes & Colleges	Small	10	49	0%	9%	10%	33%	35%	46%	47%	58%	59%	69%	70%
	Middle	50	499	0%	11%	12%	34%	35%	46%	47%	58%	59%	69%	70%
	Large	500	2999	0%	14%	15%	34%	35%	46%	47%	58%	59%	69%	70%
	Mega	3000	-	0%	14%	15%	34%	35%	46%	47%	58%	59%	69%	70%
36- Private & Public Schools for Girls	Small	10	49	0%	29%	30%	49%	50%	59%	60%	69%	70%	79%	80%
	Middle	50	499	0%	39%	40%	49%	50%	59%	60%	69%	70%	79%	80%
	Large	500	2999	0%	39%	40%	49%	50%	59%	60%	69%	70%	79%	80%
	Mega	3000	-	0%	39%	40%	49%	50%	59%	60%	69%	70%	79%	80%
37- Private & Public Schools for Boys	Small	10	49	0%	9%	10%	19%	20%	26%	27%	33%	34%	39%	40%
	Middle	50	499	0%	14%	15%	19%	20%	26%	27%	33%	34%	39%	40%
	Large	500	2999	0%	14%	15%	19%	20%	26%	27%	33%	34%	39%	40%
	Mega	3000	-	0%	14%	15%	19%	20%	26%	27%	33%	34%	39%	40%
38- Foreign Schools	Small	10	49	0%	4%	5%	9%	10%	16%	17%	23%	24%	29%	30%
	Middle	50	499	0%	6%	7%	14%	15%	19%	20%	24%	25%	29%	30%
	Large	500	2999	0%	6%	7%	14%	15%	19%	20%	24%	25%	29%	30%
	Mega	3000	-	0%	6%	7%	14%	15%	19%	20%	24%	25%	29%	30%
39- Security Guards	Small	10	49	0%	49%	50%	74%	75%	77%	78%	80%	81%	84%	85%
	Middle	50	499	0%	50%	51%	75%	76%	78%	79%	81%	82%	85%	86%
	Large	500	2999	0%	51%	52%	76%	77%	79%	80%	82%	83%	86%	87%
	Mega	3000	-	0%	51%	52%	76%	77%	79%	80%	82%	83%	86%	87%
40- Private Employment Offices	Small	10	49	0%	49%	50%	74%	75%	77%	78%	80%	81%	84%	85%
	Middle	50	499	0%	50%	51%	75%	76%	79%	80%	82%	83%	85%	86%
	Large	500	2999	0%	51%	52%	76%	77%	79%	80%	82%	83%	86%	87%
	Mega	3000	-	0%	51%	52%	76%	77%	79%	80%	82%	83%	86%	87%
41- Kindergarten	Small	10	49	0%	9%	10%	33%	34%	45%	46%	57%	58%	69%	70%
	Middle	50	499	0%	11%	12%	34%	35%	46%	47%	58%	59%	69%	70%
	Large	500	2999	0%	14%	15%	34%	35%	46%	47%	58%	59%	69%	70%
	Mega	3000	-	0%	14%	15%	34%	35%	46%	47%	58%	59%	69%	70%

42- Bread & bakery trade	Small	10	49	0%	1%	2%	4%	5%	6%	7%	8%	9%	10%	11%
	Middle	50	499	0%	3%	4%	6%	7%	9%	10%	12%	13%	14%	15%
	Large	500	2999	0%	6%	7%	12%	13%	14%	15%	16%	17%	19%	20%
	Mega	3000	-	0%	6%	7%	12%	13%	14%	15%	16%	17%	19%	20%
43- Ready-Mixed Concrete	Small	10	49	0%	4%	5%	7%	8%	14%	15%	21%	22%	29%	30%
	Middle	50	499	0%	5%	6%	12%	13%	19%	20%	26%	27%	34%	35%
	Large	500	2999	0%	5%	6%	14%	15%	21%	22%	28%	29%	34%	35%
	Mega	3000	-	0%	5%	6%	14%	15%	21%	22%	28%	29%	34%	35%
44- Information Technology	Small	10	49	0%	4%	5%	9%	10%	16%	17%	23%	24%	29%	30%
	Middle	50	499	0%	9%	10%	19%	20%	26%	27%	33%	34%	39%	40%
	Large	500	2999	0%	14%	15%	29%	30%	34%	35%	39%	40%	44%	45%
	Mega	3000	-	0%	14%	15%	29%	30%	34%	35%	39%	40%	44%	45%
45- Private & Public Schools for Boys & Girls	Small	10	49	0%	14%	15%	29%	30%	36%	37%	43%	44%	49%	50%
	Middle	50	499	0%	19%	20%	29%	30%	36%	37%	43%	44%	49%	50%
	Large	500	2999	0%	19%	20%	29%	30%	36%	37%	43%	44%	49%	50%
	Mega	3000	-	0%	19%	20%	29%	30%	36%	37%	43%	44%	49%	50%
46- Fuel Stations	Small	10	49	0%	1%	2%	4%	5%	11%	12%	18%	19%	24%	25%
	Middle	50	499	0%	1%	2%	5%	6%	12%	13%	19%	20%	26%	28%
	Large	500	2999	0%	3%	4%	6%	7%	14%	15%	22%	23%	30%	31%
	Mega	3000	-	0%	4%	5%	7%	8%	15%	16%	23%	24%	30%	31%
47- Stone, Granite & Brick	Small	10	49	0%	0%	1%	4%	5%	9%	10%	14%	15%	19%	20%
	Middle	50	499	0%	4%	5%	8%	9%	13%	14%	18%	19%	24%	25%
	Large	500	2999	0%	4%	5%	9%	10%	17%	18%	25%	26%	34%	35%
	Mega	3000	-	0%	4%	5%	9%	10%	17%	18%	25%	26%	34%	35%
48- Transport of Goods outside Cities	Small	10	49	0%	0%	1%	3%	4%	10%	11%	17%	18%	24%	25%
	Middle	50	499	0%	1%	2%	5%	6%	12%	13%	19%	20%	25%	26%
	Large	500	2999	0%	1%	2%	7%	8%	13%	14%	19%	20%	25%	26%
	Mega	3000	-	0%	1%	2%	7%	8%	13%	14%	19%	20%	25%	26%
49- Clustered Entities	Small	10	49	0%	3%	4%	9%	10%	19%	20%	29%	30%	39%	40%
	Middle	50	499	0%	4%	5%	16%	17%	24%	25%	32%	33%	39%	40%
	Large	500	2999	0%	9%	10%	23%	24%	28%	29%	33%	34%	39%	40%
	Mega	3000	-	0%	9%	10%	23%	24%	28%	29%	33%	34%	39%	40%
50- Accommodation & Hotels	Small	10	49	0%	5%	6%	11%	12%	19%	20%	27%	28%	36%	37%
	Middle	50	499	0%	7%	8%	19%	20%	29%	30%	39%	40%	49%	50%
	Large	500	2999	0%	9%	10%	24%	25%	33%	34%	42%	43%	52%	53%
	Mega	3000	-	0%	9%	10%	24%	25%	33%	34%	42%	43%	52%	53%

Chapter 3 Literature Review

3.1 Introduction

The discussion of the labour market in the previous chapter points to unique issues, all of which have been addressed in some respect in the labour economics literature. This thesis considers four strands of this literature on labour market issues – the theory of labour demand, dual labour markets and migration, policies that address market failures such as affirmative action and minimum wage, and consequences such as productivity.

3.2 Labour Demand Theory

Although supply and demand theory suggests that markets are at the wage equilibrium, it might not be the case in practice as there are a number of factors that can affect either the demand or the supply curves that may cause disequilibrium. Some of these factors could be market-related such as changing jobs, hiring and firing and training needs with temporary transitions. There are also non-market factors such as laws, customs and institutions that might limit the choices of both employers and employees. Such non-market factors usually result in increasing the wage above the market level, for example minimum wage and union laws. The existence of such laws would result in a decline in the demand and a surplus of supply which leads to unemployment. Having a wage that is above the equilibrium "above-market" wage also hinders the growth of new jobs in the market, causing the unemployed to stay unemployed for longer (Borjas, 2003).

Basic labour demand theory assumes that firms seek to maximise profits. Hence, as long as an addition of one employee would produce a positive marginal product of labour (MP_L), firms will continue to hire more employees until this marginal revenue becomes equal to the marginal expense. With the increased costs on firms, resulting from the *Nitaqat* policy, a study of firm behaviour will be conducted in Chapter 4 in relation to labour demand theory. Figure 3.1 shows the change in demand when the wage on the employer increases.

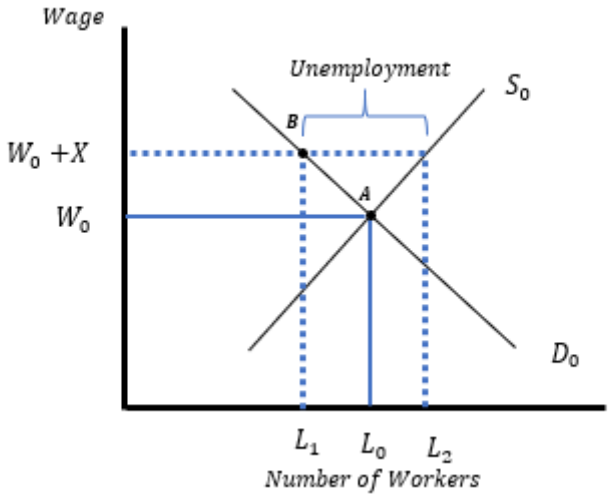


Figure 3.1: Policy effect in terms of demand theory (Ehrenberg and Smith, 2012).

At a state of perfect market, the optimum wage would be W_0 indicating the wage at the equilibrium state that firms are willing to pay and the maximum supply (L_0) would accept. Basic supply and demand theory suggests that if there was an increase of cost to the employer, in this case, the *Nitaqat* policy, the cost to the employer is higher per employee raising W_0 to $W_0 + X$, where X represents the higher cost, a movement along the demand curve occurs from point A to point B, and the number of workers demanded will decline from L_0 to L_1 resulting in lower employment levels (higher unemployment).

Frictional unemployment appears as a result of disequilibrium. That is when both the workers and job vacancies take time to be matched, this is mostly due to miscommunication (Borjas, 2016). For example, the transmission of information of job vacancies and job seekers formed by the institutional structure of the economy or a mismatch between skill requirements of a job to the skills of the unemployed (Pissarides, 2011). Therefore, the existence of frictional unemployment does not raise alarm bells for policy makers, as it is usually short term, and can be reduced by providing better communication or platforms between job seekers and firms (Borjas, 2016). According to Pissarides (2011), unemployment is the outcome of a decentralised equilibrium. With these frictions appearing in the market, the concept of a matching function comes into place, where it captures features of frictions appearing in the labour market. In relations to productivity, the scenario of frictionless markets allows the most productive jobs to survive, since competition drives the best match between wages in all jobs to the most productive, therefore productivity is maximised (Pissarides, 2011).

In economies where workers do not have strong incentives to accept job offers, the friction in the markets appear more so than others. In the case of Saudi Arabia, these reasons lie under the social structure where the family supports the unemployed family member until they find an acceptable job. Therefore, Pissarides (2011) suggests that there is a positive relationship between higher friction and higher unemployment levels in an economy.

To reduce market frictions, and increase employment levels, many policy makers introduce employment protection legislations. Pissarides (2011) discusses the difference between Southern European countries and Northern European countries in terms of restrictions on dismissals. As southern countries have more restrictions and a form of taxation on dismissal, the low productivity jobs will persist as firms would rather put up with lower productivity

than pay high fees for dismissal. This results in a lower average productivity yet reduces the firing rate, hence the flow to unemployment declines. However, because of higher stakes due to the dismissal tax, it becomes more difficult to hire workers, therefore the job creation also falls, keeping the current unemployment flow as it is. The Saudi labour law restricted the private sector from firing their Saudi employees for decades. Many bureaucratic restrictions were implemented to the point that it was virtually impossible to fire any Saudi employee. This had a major role in the private sector, with firms preferring to hire foreign workers over Saudi workers as they have less protection laws. After the introduction of Nitaqat, the dismissal laws were relaxed, allowing for easier firing of Saudis as a way to encourage their hiring. Overall, empirical studies have shown little impact of these protection laws on unemployment, however, they do suggest lower average productivity, and longer durations whether in employment or unemployment.

Policies such as Nitaqat increase the hiring costs on firms. According to Hamermesh (1993), labour demand theory suggests that facing increased hiring cost, profit maximising firms will only hire workers if their marginal product is equal or higher than their marginal cost. This suggests that unemployment will remain constant for longer periods with higher adjustment costs, as firms become more hesitant to hire with the added costs. Policies aimed at increasing hiring costs will reduce profit opportunities, therefore, resulting in a lower market entry rate and higher exit rate with the lower profits. Such policies also increase the cost of an additional worker; therefore, firms would prefer to increase hours worked of existing workers to avoid the hiring cost, resulting in reduced productivity (Hamermesh,1993).

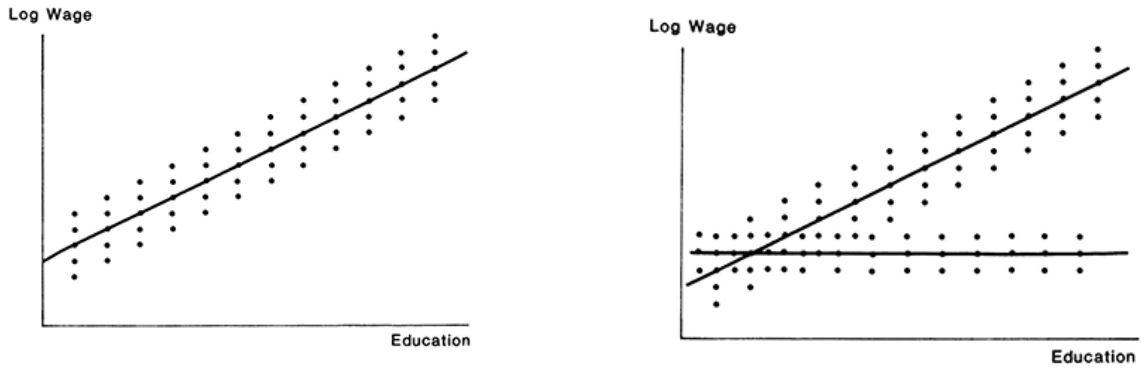
3.3 Dual Labour Market Theory

Reich et al. (1973) define labour market segmentation as "the historical process whereby political-economic forces encourage the division of the labour market into separate submarkets, or segments, distinguished by different labour market characteristics and behavioural rules".

Labour market segmentation theory was developed in the early 1960s, and contradicts neo-classical economic theory (Reich et al., 1973), which assumes an integrated labour market with open competition in demand and supply. In the neoclassical labour theory, differences across individuals are captured through higher marginal products for observed characteristics such as skill or level of education or through the theory of compensating wage differentials which suggests that people who are willing to accept riskier or dirtier jobs would receive higher wages than those who prefer taking safe and clean jobs. However, in the theory of labour market segmentation, the difference in labour compensation or wages has little to do with ability or the type of job but rather is a result of political and economic forces within the country. In this theory, labour market segmentation is usually divided into two markets, primary and secondary, hence it has come to be referred to as dual labour market theory.

According to Dickens and Lang (1985), dual labour market theory has two main assumptions. The first is that there is a primary and a secondary market in terms of wages. In their model the secondary market consists of the low-wage labour with no returns to schooling and lack of training on the job. Secondly, the model assumes that there are barriers that are non-economic that prevent secondary market workers into moving to the primary market. The secondary jobs are mainly low-wage, low-productivity, have poor working conditions, low

job security, and few opportunities to upgrade to primary jobs. Meanwhile, the primary jobs are highly paid, have good working conditions and more opportunities for career progression.



A B

Figure 3.2: Dickens and Lang (1985) formulation of different labour markets

Figure 3.2, illustrates the operation of dual labour markets. Figure 3.2.A shows a hypothetical plot of human capital theory in a standard labour market where earnings and education are positively correlated. Figure 3.2.B shows a more accurate representation of a dual labour market. The primary market acts according to the human capital theory where investment in human capital such as education or experience results in an increase in wages. In contrast, the secondary market has a straight horizontal line which suggests that regardless of the level of education the individual might have, other factors such as ethnicity or gender can determine the wage level of the individual.

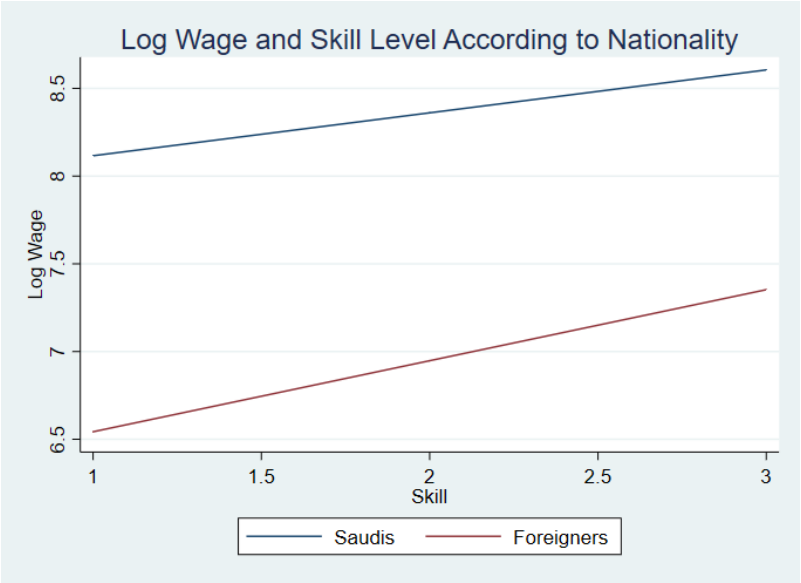
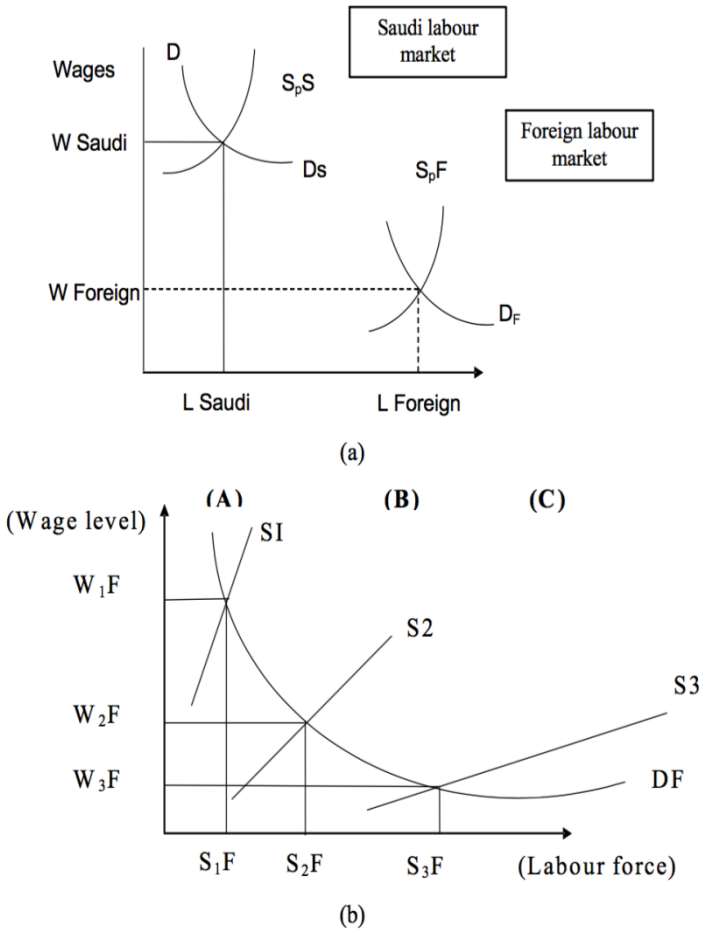


Figure 3.3: Log *Wage* and *Skill* according to *Nationality: Source: GOSI*

The model of duality can be readily applied to the Saudi labour market. Figure 3.3 above shows the difference of the fitted line of log of wage in relation to skill between nationals and non-nationals in the GOSI data. Although Dickens and Lang (1985) conducted this analysis based on education level, it has been suggested by the providers of the GOSI data that the education variable is not necessarily accurate. Hence, for the purposes of this research it was decided to replace education with skill as an indicator of the level of education. The skill variable was developed using over two thousand different occupations provided by the GOSI dataset. Following the framework of Reijnders and deVries (2017), the occupations were aggregated into three skill levels; high, medium, and low. The figure suggests a duality in the Saudi labour market, where the primary sector consists of the Saudis, and the foreigners are mostly in the secondary sector. Although there is foreign high skilled labour in the primary sector, their share is negligible.

Rebitzer (1993) suggests that the description of the dual labour market in general does not justify why this duality has occurred. In the case of Saudi Arabia, duality in the market arose due to political and economic forces as mentioned by Reich et al. (1973) in their definition of labour market segmentation theory, such as the lack of strategic economic drivers of growth and employment; changing demographics; and structural economic imbalances (Ramady, 2005). These economic forces have allowed the inward flow of migration during the 1970s and early 1980s where the oil prices were rising, and the economy was booming. The local manpower was not able to accommodate this growth. According to the third five-year development plan (MOP, 1980) the labour force has grown by around 41% between 1975 and 1980 from 1.75 million to 2.47 million respectively, raising the levels of inward migration while at the same time developing the level of education in local human capital. As mentioned earlier, a segmented labour market involves different divisions within the market, either by gender, nationality, educational attainment, and so on. Each division functions in a different labour market, with different working environments, different career opportunities, different incomes and different institutions (Reich et al., 1973).



Note: (a) Duality of Saudi labour market. (b) Demand and supply of expatriate labour in Saudi Arabia by market segmentation

Figure 3.4: Duality of Saudi Labour Market (Ramady, 2005)

As explained by Ramady (2005), Figure 3.4 represents a snapshot of the wage segmentation in the Saudi labour market; showing the difference in demand and supply between Saudi and non-Saudi workers. In Figure 3.4a, the Ds and SpS are the demand and supply for Saudi labourers, whereas Df and SpF are the demand and supply for foreign labourers. There are vast differences in the wage structure between Saudis and foreigners. Furthermore, the wage structure between foreigners also differs in terms of skills, as indicated in Figure 3.4.b. It has three sections: section (b.A) shows that the supply of foreign labour is rather inelastic, since it represents the higher technical and managerial skills, which accounts for the higher wage

(W_1F); these higher skilled foreign workers usually come from developed countries. In section (b.B), the curve shows a more elastic supply, with mid-level skilled workers, such as accountants or salesmen. This is a more competitive section in the Saudi labour force in terms of skill level. Thus, it is apparent that the wage is significantly lower than (W_1F). These jobs are taken more by other non-Saudi Arab workers. In section (b.C), the supply curve is almost perfectly elastic, where the wage is very low and the skill level is low as well. This is usual in manual jobs, such as those done by construction workers. These positions are usually filled by South East Asians, such as Indians and Filipinos. Any change in the labour supply would result in sharp movements in wage levels. Hence, *Saudization* policies should target job creation in section (B.b) for the moment, and, in the long run, section (b.A) with high-skilled knowledge-based jobs, for example in science and technology.

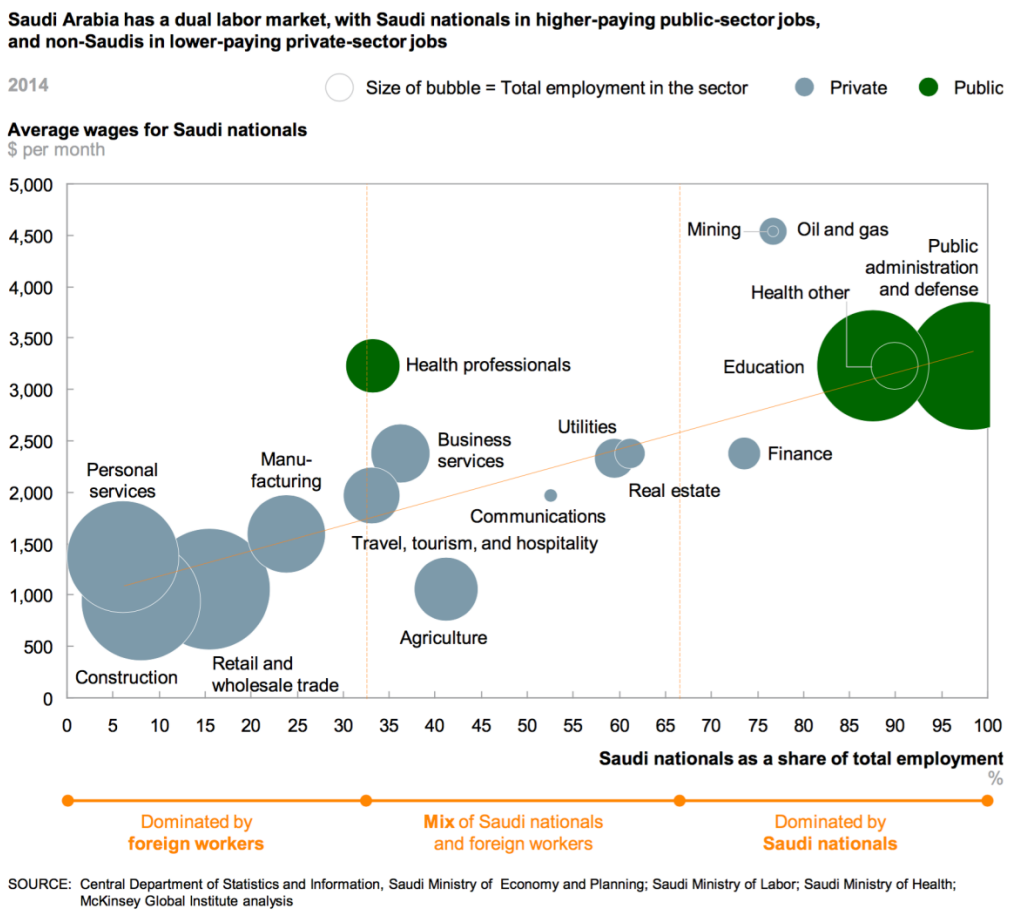


Figure 3.5: Duality of labour market in terms of industry size and sector (Al-Kibsi et al., 2015).

Moreover, Al-Kibsi et al. (2015) also confirm the existence of labour market duality in Saudi Arabia through the recorded patterns seen in Figure 3.5. It is evaluated that the upcoming demographic change could bring no less than 4.5 million new entrants into the labour market by 2030. That would almost double its size to over 10 million, if associated with above-trend increases in the female labour force. To absorb this high influx, Al-Kibsi et al. (2015) suggest that the labour market requires the creation of almost three times as many jobs for Saudis as the Kingdom created in the public sector during the 2003–13 oil boom.

These demographic changes come about in a country with a dual labour market divided between higher-paid Saudi workers, mainly in the public sector, and lower-paid foreign workers, predominantly in the private sector. The Kingdom has a relatively weak record of private-sector job creation for Saudi nationals, which will be a major challenge and also an opportunity, regardless of the future trajectory of oil prices.

Moreover, Rebitzer (1993) also suggests that the elimination of a dual labour market cannot be done by natural forces, serious actions need to be taken to solve the problem. In the case of the United States, it was the affirmative action policies, and in the case of Saudi Arabia, it was the *Saudization* policies and more recently *Nitaqat*. Furthermore, with *Nitaqat* encouraging the employment of Saudis and reducing foreign share in the labour market, it represents a great chance to open the doors for more Saudi female participation in the labour market and reduce the gap between male and female employment. Since the duality in the Saudi labour market is between natives and foreigners, the next section will discuss migration theory and impacts on immigrants and natives.

3.4 Migration

The theory of human capital suggests that labour mobility is an investment, where migrants bear the extra costs in an earlier period to gain returns over the long run. Foreign-born migrants form 10%-20% of the population of Europe and North America (Hanson, 2009). In Saudi Arabia they comprise 30% of the total population (SAMA, 2016). Human capital theory suggests that migrants flow from poor income countries to countries with better opportunities in order to achieve long-term returns.

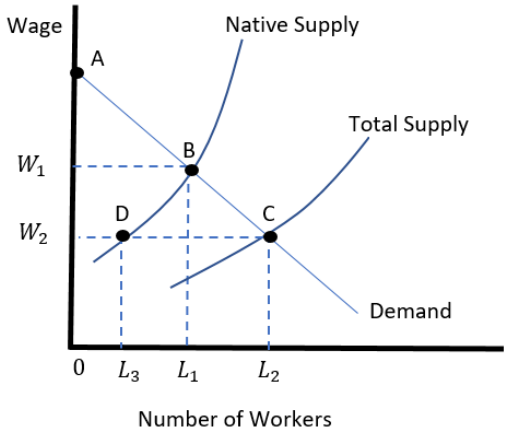


Figure 3.6: Demand, supply and elasticity change for low skilled jobs (Ehrenberg and Smith, 2012).

Figure 3.6 explains the demand and supply theory for "rough labourers", i.e. those who take on undesirable jobs (Abrams and Abrams, 1975). Without foreign labour, the restricted supply of native labour would require the wage to be higher, and the level of labour set at L_1. With the addition of foreign labour or migrant labour, the labour supply curve would shift outward and flatten, indicating the higher responsiveness level (higher elasticity) of immigrants, to changes in wages than the natives. This would result in wages declining from W_1 to W_2 and labour increasing from L_1 to L_2, where there are a higher number of immigrants willing to accept jobs at a lower wage. In the meantime, L_3 represents the number of native labourers willing to accept jobs at this lower wage level. This confirms the theory that immigration negatively affects native employment as these workers enter a competitive labour market (Ehrenberg and Smith, 2012). A question then arises of whether a policy to deport illegal immigrants would create the same number of jobs for native workers. The theory assumes that this is not the case, as deporting illegal immigrants would raise the number of workers from L_3 to L_1, raising the wage back up from W_2 to W_1 again.

Human capital theory suggests that within two types of labour, natives and immigrants, in a competitive model, the main estimation is that immigrants tend to reduce the employment of natives if they are both substitutable in the production process. This was seen in Western Europe in the 1980s and 1990s where there was little employment creation for natives while employment of immigrants grew substantially. Angrist and Kugler (2003) suggest that the more restrictive institutions that are put in place to protect native employment, such as wage rigidity, firing costs, and firm entry cost, the higher the negative impact felt on native employment.

When analysing the effect of immigration of cheap labour on employers, employers are winning in the short run. As the cost of labour declines with additional cheap labour, the profits of employers increase. This increase will spill over into higher capital returns, which would act as a signal for a good investment, encouraging more people to enter the market as owners. Moreover, the rise in profits alongside the increased number of employers would eventually return to equilibrium. Immigration has increased the stock of capital and created more opportunities in the economy (Hanson, 2009).

In the framework of labour demand and supply, the literature debates the effect of migration on native employment. Some argue that immigrants cannot be a perfect substitute for native workers mostly because natives are likely to have better communication skills which results in a comparative advantage in communication-intensive jobs. Meanwhile, immigrants appear to have an advantage in manual jobs (Moreno-Galbis and Tritah, 2016).

Moreno-Galbis and Tritah (2016) argue that there is a lack of negative effects on natives' labour market outcomes. Since immigrants are new to their host country; they lack the local labour market knowledge and other valuable assets, such as unemployment benefits that

would be offered to natives. This makes it urgent for immigrants to find a job resulting in lower bargaining power in terms of wages, making them more profitable to employers. Therefore, it is argued that even if immigrants are perfect substitutes for natives in the production process, immigrants form a positive externality. The variety of options between natives and immigrants in the labour market may account for the difference in wages between the two groups.

In the case of the impact of immigration on the labour market and wages, Borjas (2003) suggests that the level of experience with a similar educational background does make a difference in the labour market and, experienced and less experienced workers do not form perfect substitutes. Moreover, he suggests that immigration reduces wages of substitute workers, estimating that a 10% rise in supply of workers would reduce wages by 3-4%.

Since the duality in the Saudi labour market has to do mainly with foreign labour, it is essential to review the literature that links the dual labour market theory with migration. DeCoulon and Wolff (2004) highlight the different debates in the literature that link the two theories. The first is a static model developed by Carter (1999) where he examines the impact of illegal immigrants on employment, wages and natives' welfare especially in the secondary sector. He argues that natives do gain from illegal migration at first, as natives can enter the primary labour market sector, where the model assumes rising demand. However, natives can be at a disadvantage in the long run, as the number of immigrants increase in the host country and they can later move into the primary job sector too. Furthermore, Carter (1999) continues to explain the model by identifying the difference between migrants and natives in his model, where empirically, migrants are assumed to be leaving the market after a short period. This is because illegal immigrants frequently go back to their home country, hence the existence of

labour market segmentation. Carter (1999) finds that if illegal immigrants are scarce, then they would mostly occupy the secondary market consisting of low-wage jobs, leaving natives to be more involved in primary sector jobs that are characterised as a higher wage sector. This drives the notion that illegal immigrants help native workers. With the increase in migration, segmentation becomes more apparent. However, as migrants continue to increase, they reach a point of conversion where both natives and migrants compete for primary-sector jobs (Carter, 1999). Müller (2003a, 2003b) expands on this static model proposed by Carter (1999), to include dynamic adjustments, which allows the study of the impact of the legal migration on both natives and foreigners. Since foreigners are more likely to return to their home country, the results showed discriminatory behaviour in hiring depending on the probability of returning to the home country.

However, De Coulon and Wolff (2004) state that these theoretical contributions have not been associated with empirical testing of dual labour market theory. There have only been a few studies that linked immigrants with dual labour markets, which is puzzling especially since immigrants usually take jobs with low wages and bad working conditions i.e. the secondary market jobs (De Coulon and Wolff, 2004). There has been some evidence of dual labour markets in developed countries such as Germany and Switzerland which have a "guest-worker" system. Dustmann (1993) concludes that German natives earn significantly higher wages than foreign workers, usually in the secondary market, with no evidence of convergence over time. Likewise, De Coulon et al. (2003) also find that immigrants in Switzerland earn significantly lower wages than native workers. This confirms the idea of dealing with immigrants as the secondary sector in a dual labour market framework.

Guest worker immigration policy in Switzerland is very similar to that in Saudi Arabia. It also exists in other countries such as Germany and Spain. The main idea of the guest worker is to enter the country for work purposes only, typically without their family, staying for a while and then eventually returning to their home country (De Coulon and Wolff, 2004). Müller (2003) finds that there are different behaviours toward immigrants and to natives in hiring, especially with regards to their probability of returning to their home countries. He suggests that in countries with few immigrants, the host country usually employs these immigrants in the secondary sector. As the number of immigrants grows, the segregation continues and becomes clearer as natives work in the primary sector and migrants work in the secondary sector. However, if the number of immigrants becomes large enough, larger firms will tend to hire some immigrants in the primary market, although they are likely to continue to be employed mostly in the secondary market.

De Coulon and Wolff (2004) put forward several factors that prevent employers from hiring minorities into the primary sector. Firstly, that the wage of primary workers is not sufficient to prevent minorities from shirking[9]. Secondly, minority workers are likely to have liquidity constraints. Therefore, these minority workers will accept lower wages where they can start immediately rather than investing in their education or apprenticeship programs and expecting higher future returns. Thirdly, they argued the existence of statistical discrimination theories, as De Coulon and Wolff (2004) suggest that minority workers or immigrants are considered less productive than their native counterparts especially in regard

9 Shirkers are "workers who are not sufficiently motivated by their current wage and who consequently do not work as efficiently as they would if they were better paid" (De Coulon & Wolff, 2004).

to language skills. As Dustmann and Fabbri (2003) show, the inability to master the language of the host country acts as a signal to employers of being less productive. De Coulon and Wolff (2004) concluded that the low skilled migrants from Southern European countries such as Italy and Spain are found in the secondary sector, whereas the high skilled migrants from Western European countries are usually found in the primary sector.

3.5 Affirmative Action Policy

Affirmative action is defined as policies enforced by government agencies, employers or universities to overcome discrimination and improve the economic status of minorities and females (Holzer and Neumark, 2006). The phrase "affirmative action" was introduced in a set of executive orders by US presidents in the 1960s, targeting employment discrimination. However, there was controversy behind these policies in the US, as they contradicted "Equal Employment Opportunity" Laws and other regulations (Holzer and Neumark, 2000). They argue that differences between affirmative action and equal employment opportunity policies are apparent more in theory than in practice. Affirmative action policies seem the most relevant to *Nitaqat* policy especially in terms of the labour market impact. Affirmative action law was enacted in 1965 in the US (Griffin, 1992), and targets federal contractors prohibiting discrimination in employment. The most serious penalty for non-compliance is the disbarment of future contracts (Griffin, 1992). It is the closest government program to *Nitaqat*. Therefore, it is interesting to see its impact on firms and compare the effect of the two programs. However, affirmative action policies extend beyond the United States. There have been similar policies such as the "Equality Act 2010" in the UK (Hepple, 2010), "Employment Equity" in Canada (Agocs and Burr, 1996), and the "Reservation" system also

referred to as affirmative action in India (Weisskopf, 2004). These policies, in basic terms, protect disadvantaged groups in the labour market from discrimination. Policies can take several forms, such as employment quotas, equal wage rights, or just an encouragement for equality across all races and gender.

However, there has been some controversy around these policies and they have been criticised in the academic literature. As mentioned, the main purpose of these policies is to reduce or eliminate the existing discrimination in the labour market or education. Although they have the good intentions of lessening discrimination in the workplace, some argue that affirmative action policies can cause a reverse discrimination against more privileged groups, since it limits their opportunities. It has also been argued that workers should be hired based on their credentials and qualifications. Imposing affirmative action may force firms to hire less qualified people to meet the requirements which results in wasted opportunities in raising their profits or their productivity (Welch, 1976, Holzer and Neumark, 1999, Griffin, 1992).

Furthermore, Griffin (1992) makes use of the Le Chatelier principle[10] in his analysis – this clarifies how the direct impact of a change in a parameter can be amplified through the reaction in the system they are in, showing how small changes can have large impacts (Milgrom, 2006). Griffin (1992) found that treated firms under the affirmative action policy which are contractors have less elastic labour demand. The Le Chatelier principle suggests that imposing restrictions on the behaviour of an agent would have two results. First, the

10 The Le Chatelier principle, also known as "the equilibrium law", is used in chemistry to measure the impact of a change in condition on a chemical equilibrium. Paul Samuelson (1947) introduced the same principle in the form of an application to demand theory, where under certain circumstances, if the consumption of the consumer is fixed for good X, the elasticity of the consumer's demand will be reduced for any other product Y. In the event of the availability of multiple other goods, (X1→Xn) should reduce the elasticity even further if each additional good was fixed (Milgrom, 2006).

agent cannot advance with these restrictions and, second, the aptitude to react to changes by the agent in its environment will be reduced. Griffin (1992) suggests that the Le Chatelier principle can act as a good examining tool for government programs that limit the hiring decisions of firms.

Moreover, affirmative action policy has affected labour demand in the US. Griffin (1992) indicates that binding hiring quotas will raise costs for firms causing lower elasticity in their demand for inputs, as well as increased difficulty in substituting between production inputs. Griffin (2012) estimated that affirmative action policies with binding minimum quotas would raise costs by 6.5%. This provides evidence for the hypothesis that affirmative action does restrict firm behaviour. Ashenfelter and Heckman (1974) have found a significant effect of the affirmative action policy in the US in enhancing the representation of different minority labour groups with no effect to occupation. Leonard (1984) studies the effect of the affirmative action program in a later period, between 1974-1980, and suggests that the program had a vital role in improving employment levels and occupations for women and minorities.

The model of Welch (1976) studies the impact of employment quotas on minorities. The model has two groups; the skilled minority and the skilled majority. The quota requires that for every hire of a majority skilled worker, there needs to be a quota (<1) minority worker hired in the same position. Moreover, Welch (1976) suggested "skill bumping" as a solution to the treated firms. Due to the lack of skilled minorities and the inability to hire skilled majority because of the quota restrictions, firms had no option but to hire unskilled and less qualified minorities to raise their quota. However, Welch (1976) suggests that affirmative action policy has resulted in less-skilled minorities being hired in more skilled jobs, leading

to higher costs of production, decreased performance measures in terms of cost and profitability, and loss in efficiency. He also suggests that earnings of the minority group would increase because of the policy, yet overall, such a quota model raises inefficiencies in the labour market. Holzer and Neumark (1999) evaluated Welch's model, also finding that this model can result in skilled workers being hired less as the minority group of skilled workers cannot be met. Therefore, this results in higher costs of production thereby raising inefficiencies in the market (Holzer and Neumark, 1999). The model of Welch (1976) studies affirmative action policy in its most extreme case where it is treated as an employment quota escalating the affirmative action policy to the whole economy. Welch's assumption resembles the *Nitaqat* policy. Therefore, this might give an early indication of the effect such policies could have in an economy.

The strategy of 'skill bumping' was also applied to *Nitaqat* where, as mentioned in Chapter 2, firms had resorted to "masked employment" where they hire Saudis with low wages and do not actually use them, so they either have nothing to do in the workplace or are even asked not to attend work but still receive a wage as they raise quotas. Therefore, skill bumping (Welch, 1976) is akin to masked employment in the case where Saudis are hired not because of their qualifications but rather because they can easily help meet the quota. It appears that, although not supported or anticipated by the *Nitaqat* policy system, this is what firms resorted to, in order to minimise the impact of the policy and be allowed to hire more foreigners. However, after 2016, the Ministry of Labor, which oversees the implementation of *Nitaqat,* detected the problem of masked employment. In an attempt to stop this, it introduced a new regulation in the system where the firm can directly pay the MOL, where the payment upgrades the firm into the higher colour category, and the MOL uses this payment for the rewards of training and partial wage payments for compliant firms.

Welch (1976) also assumes that affirmative action policy results in productivity losses as workers are hired because of the policy rather than because of their qualifications. He argues that different employers engage in different types of discrimination. Employers who do not discriminate and would hire the minority group regardless of the presence of the quota, have a comparative advantage over others. However, with the existence of the quota system, the skilled minority need to be distributed among firms as a share of the skilled majority. This causes an increased level of discrimination which spills over to an increase in social costs. Furthermore, Welch (1976) suggests that in an economy-wide quota system with two groups, two consequences occur instantly. First, the aggregate employment drops, therefore there is a drop in aggregate output or productivity. As a result, average income of the majority group should fall accordingly to average out the income between minority and majority groups. Secondly, the total skilled to unskilled employment ratio alongside the productivity of skilled labour will rise relative to the productivity of unskilled labour.

Leonard (1985) conducted an analysis on the affirmative action policy in the US, analyzing the policy's targets and how it can become more effective. Leonard (1985) found that the compliance reviews were mostly conducted on large firms that do employ more minorities than others. Meanwhile, firms that do discriminate and have less minorities, if any, are not reviewed by the Office of Federal Contract Compliance Programs (OFCCP). He further recommends that for the affirmative action policy to be effective and to fight discrimination properly, the reviews need to target firms that do have smaller percentages of minorities, while controlling for size, industry and region (Leonard, 1985). The *Nitaqat* policy did control for size and industry. A regional control was not necessary in Saudi Arabia as the system is centralised therefore region control is already given by the economy.

Leonard (1984) also studied the changes in employment percentages in firms between 1974 and 1980 between the treated group, the contractors, and the control group, the non-contractor firms. He concluded that although the proportion of minorities increased in treated firms, the majority employment declined, albeit at a very modest rate. For example, Leonard suggests that employment growth over the six-year period declined for white males 1.5%, to 2.6%, and white female employment growth rose by a little over 2%. Meanwhile, employment of black males grew by 5% and black females by 10%. However, Smith and Welch (1984) argue that the effect of the affirmative action policy on employment was greater in the earlier period prior to 1974, although there was a weaker enforcement of the policy. Furthermore, Leonard (1983) studied the laws of anti-discrimination in the US, and argued that these laws reduce productivity as employers need to employ less qualified people to perform a job. When measuring the ratio of productivity of minority to white males, or females to white males, Leonard (1983) finds that there is no significant evidence of declined productivity of minorities nor females in relation to their white male counterparts.

Welch (1976) also measured the impact of affirmative action on the aggregate economy level and concluded that both aggregate employment and productivity had declined. Meanwhile, Holzer and Neumark (1999) analysed the flow of employment, and found that the proportion of white male employment had declined by between 10% to 15% to be redistributed between the minority group of blacks and females. However, studies that analysed the share of employment all show modest results mainly due to the weak enforcement of the policy. Leonard (1984) studied the effect using the production function and found that the policy has no negative impact on productivity in contractor firms. However, Holzer and Neumark (1999) argue that this finding is uninformative due to the highly aggregated level at which the analysis was completed. Meanwhile Welch (1976) concludes that there is an impact, notably

a decrease in productivity at the aggregate level.

Holzer and Neumark (2006) reviewed the impact of affirmative action policy in employment, government procurement and university admissions. It was found that affirmative action policies do have an effect on targeted groups, such as minorities and females. For example, job distribution in fact shifted employment from white males towards minorities with lesser qualifications. Yet there was no evidence showing less labour market efficiency. As for universities, students who were admitted under the affirmative action policy showed higher dropout rates and weaker results. These policies resulted in positive externalities in low-income communities, including; people with fewer qualifications being given the chance to receive better jobs in terms of income or status, and students being admitted to better schools and receive good education.

Holzer and Neumark (1998) used a difference-in-differences approach to analyse the performance of the majority white male against the minority and female employees in firms between treated and control firms. They found that although the qualifications of minority groups are lower in the treated group of firms, their performance on-the-job does not appear to be affected by their lower qualifications[11]. The theoretical literature on labour economics suggests that due to the weak enforcement of the affirmative action policy, it has been difficult to provide conclusive results in determining whether the policy enhances or reduces efficiency. This thesis examines a similar policy, *Nitaqat*, with its strict rules and application to the whole economy.

[11] Results exclude Hispanic males.

3.5.1 Affirmative Action in Relation to Saudi Arabia

Theoretical models have produced ambiguous projections in terms of the efficiency effects of these policies and the net effect, which depends on the type of discrimination modelled and the context of the labour market studied (Holzer and Neumark, 2000). Therefore, empirical evidence is vital.

Peck (2017) sheds light on how the "*Nitaqat*" policy aims to combat some of the known symptoms of a resource curse, such as under-development of non-resource industries; high levels of unemployment; corruption and weak institutions; and political instability. These problems were noted during the time of the program application during the Arab Spring in 2011. Although there were many causes for upheaval, unemployment was always the root cause. Therefore, the program could be a perfect case study to measure the effectiveness of such programs in combating unemployment.

As the private sector in the country is young and fragile, a main concern arises as to whether it would be able to accommodate such a demanding policy (Looney, 2004, Ramady, 2013, Hertog, 2014). Peck (2017) raised important questions in her study, such as the degree of effectiveness in raising local nationalisation in the private sector and its costs. Peck (2017) conducted the first analysis on the *Nitaqat* dataset. She studied the immediate shock of the program upon its application. This thesis examines whether Peck's results were just a one-time shock to the economy, or whether they had a consistent, lasting effect. We have studied the program from the start of its application in July 2011 until October 2015. The results from 2013 onwards are original. Moreover, we have added the impact of the *Nitaqat* program on females in the labour market, which has never been studied in the literature.

Peck (2017) used Regression Kink Design analysis (RKD) to measure the impact of the program at a certain point in time. It has had great costs and benefits to firms. To start; firm size was one of the major costs on firms. Peck suggests that Red and Yellow firms had a negative growth of 0.5% for every one percentage point below the cut-off quota. This indicates that the policy did in fact limit firm growth in the first 16-month period. Secondly, as suggested by the RKD results, *Nitaqat* has had a significant impact on firm exit. Red and Yellow firms have had an increase in their exit rates – depending on bandwidth choice - between 0.72 and 2.17% for every 1% distance below the cut-off.

Peck (2017) suggests that the program has increased the exit rate from an expected 19% to 28% with a growth rate of 50% from 2011. Although the policy was able to raise employment figures immediately it may have negative impacts on sustainable economic development. Peck further suggests that *Nitaqat* was successful in raising local employment levels, but the cost on firms was extremely significant. Additionally she also suggests that the program was responsible for an increase of 2.73% in the *Saudization* rate. The program was responsible for employing 73,000 Saudis in existing firms over a period of 16 months. New entrants had higher rates of *Saudization*, employing an additional 23,000 Saudis. With greater costs on existing firms, around 11,000 firms were forced to exit the market. Existing firms also showed a tendency to shrink their total number of employees, which reduced the total number of workers in the private sector by 418,000.

3.6 Productivity

"Productivity isn't everything, but in the long run it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise output per worker" (Paul Krugman, 1997),

Productivity is "the effectiveness with which factors of production are converted into output" (Weil, 2009). The Organisation for Economic Co-operation and Development (OECD) manual defines it as a "ratio of a volume of measure of output to a volume measure of input use". The definitions of productivity do agree on the general concept of what productivity is, however, there are different measures of it. Productivity measurement is important as it provides insights about technology, efficiency and real cost savings.

How can productivity be increased at the macro, industry, and firm level? The Office of National Statistics (ONS) productivity handbook (ONS, 2007) suggests several ways in which productivity can be improved. On the macro level, improving efficiency is achieved by converting inputs into outputs across many different firms and industries. Raising productivity at the macro level could also be achieved through changing the mix of industries from lower to higher productivity. Meanwhile, on the industry level, raising productivity can be achieved through using inputs in a more efficient manner by current firms to produce higher output quantities or quality. Raising the exit rate of less productive firms and/or increasing the rate of entry of more productive firms can also increase productivity. The productivity within the firm can be raised through better management of inputs to produce output in the most efficient manner.

As mentioned, productivity is crucial to economic growth, and complementing this with higher employment produces the perfect combination of higher living standards, measured by Gross Domestic Product (GDP) per capita. The ONS (2007) suggests two ways in which GDP per capita can be increased. The first is raising employment levels or hours worked hence raising labour input. Second, holding everything constant, raising the output level of workers, i.e. increasing labour productivity.

Total Factor Productivity is defined as "the residual contribution to output growth of an industry or economy after calculating the contribution from all its factor inputs" (ONS, 2007).[12] TFP is the residual of the production function; an increase in TFP indicates that inputs in the production function are being used more efficiently (Bosworth and Collins, 2008).

One of the reasons for the differences in productivity among countries is attributed to differences in efficiency. Efficiency is the "effectiveness with which factors of production and technology are combined to produce output". The theory of inefficiency is not yet developed, however Weil (2009) describes five reasons why an economy could be inefficient: unproductive activities, not using capital or labour to their full potential, misallocation of factors among sectors, misallocation of factors among firms, and technology blocking.

First, unproductive activities refers to a situation when economic resources are redirected to unproductive activities rather than productive ones meaning there is no economic value attached to them. One example is burglary, and the use of high security systems to prevent

[12] TFP is used interchangeably with Multi-Factor productivity (MFP) in the literature (Hulten, 2001).

these thefts. If these illegal activities did not occur, then inputs spent on these activities could be used in more productive activities and raise the efficiency of the economy. Another example is rent seeking, which occurs when government policies create an artificial rent. An example is the *Nitaqat* policy change that occurred in 2016, when the Ministry of Labor started accepting payment from firms who were not fully compliant instead of raising actual Saudi employment; this is a form of unproductive activity as it defeats the original purpose of the program which was to increase the employment of nationals in the economy.

The second form of inefficiency within an economy, according to Weil (2009), is when capital or labour are not used to their full potential. Capital inefficiency can come in the form of empty lands in the middle of the city that are not being used, or a factory that does not run to its full capacity. An example of labour not being used to its full potential is unemployment, or underemployment, where workers spend only part of their time producing output instead of the whole time given. In the case of Saudi Arabia, public sector jobs employ around 90% of Saudi workers, but for only six hours of work per day. As discussed in Chapter 2, the public sector started hiring nationals as a way of distributing the oil wealth to the people. However, with the high population growth it could not maintain this model as high inefficiencies arose since many people were hired just for this purpose without the actual need for them. This has increased bureaucracy in the system as well as underemployment where the economy is not able to benefit fully from these individuals.

The third form of inefficiency suggested by Weil (2009) is the misallocation of factors among sectors. That is when resources are used to produce the wrong good or service. For instance, in a competitive economy, wages are defined as being equal to the value of marginal product of labour. Reaching the optimal efficiency level in terms of labour allocation between two

sectors happens automatically due to two factors: labour is paid the value of marginal product in the form of wages, and this marginal product or wage is different in different sectors. Therefore, employees will have a high incentive to move from a low marginal product (MP) sector to a higher one. This would result in the higher marginal product sector offering lower wages since these employees already come from a lower wage sector, and the lower marginal product sector will raise their wages to keep those employees, so the movement will continue until the marginal product is equalised in the economy, hence maximising the quantity of outputs. However, Weil (2009) suggests that this might not always be the case for two reasons: barriers to mobility and wages and marginal products not being equal. Barriers to mobility between sectors might occur in many economies and result in the wage gap between sectors persisting. These barriers might include geographic isolation, and the existence of the minimum wage; with the minimum wage firms from the higher sector not being able to expand their payroll since doing so would require reducing the marginal product below the minimum wage. The other reason for misallocation of factors between sectors is that wages might not equal the marginal product of labour. If this occurs then a change in marginal product could not translate into a change in wage, meaning workers will lose their incentive to move from one sector to another. One situation where the marginal product might not equal wages is when the labour market is segmented so that more productive workers are unable to work in certain industries. In the Saudi Arabia example, the existence of the *Nitaqat* program in a segmented or a dual labour market means it is difficult for foreigners to move freely between jobs that could better fit their skills, hence increasing productivity. Moreover, the economy is moving towards a position where some industries, e.g. retail trading, are required to only hire Saudis, hence not allowing foreigners to work in them. This might reduce productivity as foreigners are mostly low skilled workers and receive lower wages than low skilled national workers, leading to the misallocation of resources and higher

inefficiency.

The fourth form of inefficiency suggested by Weil (2009) is the misallocation of factors among firms. There are many reasons why efficiency or productivity varies between firms, as some might have inferior technologies or suffer from poor organisation or bad management. However, in an efficient economy, resources such as capital and labour will reallocate from less productive firms to more productive ones, raising the productivity of the economy. More productive firms are better at using their resources than less productive ones so their marginal profit is higher, leading to less productive firms losing money and eventually exiting the market. This leads to capital and labour of the exiting firms moving to more productive firms, therefore raising the productivity of the whole economy. The *Nitaqat* program might be beneficial to productivity if it means that exiting firms are less productive, and their resources are transferred to more productive firms who are able to absorb the extra costs of the program. This will be discussed later in Chapter 6.

The final form of economic inefficiency in Weil's the framework is the blocking of technology, which arises when a section of the population or workforce prevents the adoption and use of new technology. History is filled with examples of technology blocking. In Saudi Arabia, religious societies had banned many new technologies in the name of religion, such as the Telegram, as people were scared and not in favour of it at the beginning. Similarly, with the invention of the radio, news and information during that time were scarce and old and although the radio revolutionised the delivery of news, it was banned in Saudi Arabia for a while.

In summary Weil (2009) argues that most of the variation in productivity among countries is explained by differences in efficiency. Moreover, he suggests that the most influential factor

of efficiency within an economy is the institutional structure. For the purposes of this study it is important to notice that Saudi institutions are unique and likely to affect efficiency.

Growth Accounting

The starting point for much of the empirical work measuring productivity is the neoclassical Solow growth model (Solow, 1956):

$$Y = AF(K, L) \qquad 3\text{-}1)$$

This model has exogenous technological progress (A) as the source of growth in output. In contrast, new growth theory models technical progress as endogenously determined. Solow's model suggests that savings and population growth have a significant impact on income. However, Mankiw et al. (1992) argued that the model was incomplete and they expanded it to account for the accumulation of both human and physical capital. They warned that omitting human capital accumulation had resulted in bias in the Solow model, finding that human capital is highly correlated with both the saving rate and population growth and in particular, that it lowers the effect of both variables. Sianesi and Van Reenen (2003) argue there is vast evidence to support productivity being raised through human capital, implying that education is a vital tool to enhancing productivity, rather than just existing as a self-fulfilling tool for individuals to increase their own returns. Moreover, Lucas (2002) argues that higher educational attainment results in higher productivity.

One of the most commonly used methods in the literature to study productivity is growth accounting. This is a useful descriptive tool that is a good starting point to identify sources of growth in an economy, however it does not imply causality (O'Mahony and Timmer, 2009). It offers a good benchmark for economic performance analysis (Bosworth and Collins, 2008).

The growth accounting framework was developed by Jorgenson and Griliches (1967) and generalised in an input-output framework by Jorgenson et al. (1987). The framework is based on a production possibility frontier, where the industry gross output is a function of labour, capital, intermediate inputs and technology (O'Mahony and Timmer, 2009). The value-added production function is given by the following formula:

$$\boldsymbol{Y_j = f_j(K_j, L_j, T)} \tag{3-2}$$

Where Y is output, K is capital input, L is labour input, T indicates time, and j represents individual industries. The framework uses several assumptions; competitive factor markets, constant returns to scale and full input utilisation (O'Mahony and Timmer, 2009). The translog functional form for the production function is commonly assumed in the literature, leading to the Tornqvist index decomposition of output growth (Chambers, 1988), represented by:

$$\boldsymbol{\Delta \ln Y_{jt} = \overline{v}^{K}_{jt} \Delta \ln K_{jt} + \overline{v}^{L}_{jt} \Delta \ln L_{jt} + \Delta \ln A^{Y}_{jt}} \tag{3-3}$$

where $\overline{v}^{i}$ indicates the share of input i in a two-period average in a nominal output expressed as follows:

$$\boldsymbol{v^{L}_{jt} = \frac{P^{L}_{jt} L_{jt}}{P^{Y}_{jt} Y_{jt}}; v^{K}_{jt} = \frac{P^{K}_{jt} K_{jt}}{P^{Y}_{jt} Y_{jt}}} \tag{3-4}$$

and the technological change term A^{Y} is the growth in output over time not accounted for by inputs. Imposing constant returns to scale implies $\overline{v}^{L} + \overline{v}^{K} = 1$. Aggregate input is commonly defined as a Tornqvist quantity index of individual input type as shown below:

$$\Delta \boldsymbol{ln}\, \boldsymbol{L_{jt}} = \sum_{\boldsymbol{l}} \overline{\boldsymbol{w}}^{\boldsymbol{L}}_{\boldsymbol{l,jt}}\, \Delta \boldsymbol{ln}\, \boldsymbol{L_{l,jt}} \qquad 3\text{-}5)$$

$$\Delta \boldsymbol{ln}\, \boldsymbol{K_{jt}} = \sum_{\boldsymbol{k}} \overline{\boldsymbol{w}}^{\boldsymbol{K}}_{\boldsymbol{k,jt}}\, \Delta \boldsymbol{ln}\, \boldsymbol{K_{k,jt}} \qquad 3\text{-}6)$$

Where $\Delta \ln L_{l,jt}$ denotes the growth of worked hours by type of labour l using weights $\overline{w}^{L}_{l,jt}$ representing the average share of a given period of each type in the value of labour compensation. The same is true for K. With the assumption that marginal revenue equals marginal cost, the weights act as an influence of price (O'Mahony and Timmer, 2009). In this thesis intermediate inputs are not separately identified, due to data limitations, so instead we use a value-added production function[13].

After setting out the basic growth accounting model, it is interesting to see an application to developing countries since most of the literature is mostly focused on developed countries. A good example would be the study conducted by Bosworth and Collins (2008) analysing the growth and productivity differences between China and India based on number of workers. Bosworth and Collins (2008) studied the growth of both economies over a 26-year period, 1978 to 2004, corresponding with China's economic reform period as well as India's accelerated growth in the earlier part of the period. They found that the average annual growth of output for China was 9.3%, with labour productivity forming 7.3% and employment growth at 2%, while the TFP growth in China during the same period is 3.6%.

[13] Since accounts for intra-industry deliveries are unavailable, the value-added model is restrictive. Therefore, it is assumed that production is separable in capital, labour, and technology (Jorgenson et al., 1987)

India's annual output growth was noticeably lower, with an average of 5.4%, TFP growth was at 1.6%, summed with physical capital and education to form the labour productivity at 3.3%. Then, labour productivity is added to the employment growth of 2% totalling the 5.4% output growth. Although India's growth rate is lower than China's, when they compared India's growth during the studied period and the earlier two decades, they found an increase in growth by around 2% (Bosworth and Collins, 2008).

When interpreting the results of growth accounting, one needs to bear in mind two important aspects. First, TFP captures the impact of many determinant factors of efficiency such as government policies and political unrest, alongside the measure of technological progress. Second, results often show the proximate sources of economic growth rather than fundamental causes (Bosworth and Collins, 2008). O'Mahony and Timmer (2009) identify several effects that TFP growth might capture. First is the organisational and institutional change, which might lead to biased results. For instance, a structural reform of a business to accelerate the production process would result in negative TFP in the short run due to the resources being allocated to the reform process; however, this should yield higher TFP in the long run. Second, the neo-classical theory assumes that marginal cost is equal to marginal revenue. Any deviation from this neo-classical assumption can be picked up by the TFP, such as the herd behaviour which occurred during the dot-com bubble. Since TFP is a residual measure, it can also measure further intangibles such as investments in research and development. Finally, TFP can also include some measurement errors such as underestimation or overestimation in both inputs or outputs.

Labour input

There are three main ways to measure labour input: actual hours worked, number of

employees, and number of jobs. The OECD Productivity Manual (Schreyer, 2001), alongside the ONS Productivity Handbook (ONS, 2007), agree that using "actual hours worked" is a better measure, as it takes into account the different working patterns in different countries or industries. In addition, hours worked reflects the fluctuation that might appear within firms in response to economic changes (ONS, 2007). The ONS Productivity Handbook (2007) also explains the importance of using number of workers as a measure of labour, explaining that number of workers reflects the overall employment rate. The advantage of using number of workers in the context of productivity measurement in Saudi Arabia is that number of workers provides better detail in terms of nationality in all the datasets that are used in this study.

Furthermore, basic economic theory suggests that "workers' real hourly compensation should grow in line with GDP per hour worked over the long run" (Pessoa and Van Reenen, 2013). This indicates that wage growth is expected to trend with productivity growth in the long run. Therefore, Chapter 5 will use Mincer's wage equation (Mincer, 1974) to observe trends of earnings reflecting labour productivity. An earnings function is a function of individual wage rates regressed on a vector of personal, environmental, and market variables that influence the wage (Willis, 1986).

Physical Capital

Weil (2012) states that the growth theory consists of two main variables: physical and human capital. Physical capital is defined as an asset that is "fixed, tangible, durable, and reproducible", excluding natural resource assets such as oil (Nehru et al., 1993). It essentially consists of any physical object that helps improve the worker's ability and productivity. It refers to assets such as machines, buildings, transport equipment and infrastructure. Weil

(2012) states that there are five features of capital; it must be produced; be productive; have limited use; earn a return; and depreciate in value.

According to Pritchett (2000), one limitation with physical capital estimates is that they are often overestimated in developing countries. This is due to the overvaluation of mostly government projects because large percentages of those investments are expected to disappear along the way and sometimes projects may never come to fruition. This scenario is somewhat common in developing countries which affects the accuracy of productivity measures since the stock of capital and investments are overestimated.

According to (Nehru et al., 1993) although physical capital is unanimously accepted as an important factor of economic growth, there is no universal academic consensus on what actually constitutes physical capital, and how it can be measured. Two methods have been developed: the evaluation of capital stock through surveys directly; and the indirect perpetual inventory method (PIM). This thesis utilises the methodology of O'Mahony and Timmer (2009) for measuring physical capital using the PIM. Under the PIM model:

$$\boldsymbol{K_{i,T} = \sum_{t=0}^{\infty} \partial_{i,t} I_{i,T-t}} \quad (3\text{-}7)$$

(K) indicates a weighted sum of previous investments, where weights are allocated by the relative efficiency of capital goods at different years. And $(K_{i,T})$ represents capital stock of a single asset type i at time T, $\partial_{i,t}$ is the efficiency of capital good i at time t in relation to the efficiency of a new capital good, $I_{i,T-t}$ denotes the investment at time $T-t$. O'Mahony & Timmer (2009) assume that services by assets in different years are perfect substitutes to one another. Moreover, a geometric depreciation method is used, assuming a constant rate of

depreciation over time δ_i, yet different for each type of asset, $\partial_{i,t} = (1 - \delta_i)^{t-1}$, where

$$\boldsymbol{K_{i,T} = \sum_{t=0}^{\infty} (1 - \delta_i)^{t-1} I_{i,T-t} = K_{i,T-1}(1 - \delta_i) + I_{i,T}} \quad 3\text{-}8)$$

An aggregation of the flow of capital services can be estimated using a translog quantity index with weights based on user costs of capital.

The capital compensation in industry *j*, under the assumption of constant returns to scale, can be estimated as value added minus the labour compensation (O'Mahony and Timmer, 2009). However, in this thesis information only exists for aggregate capital and not by type of asset. Therefore, we assume a single depreciation rate where δ=0.6. This is the assumption used in Bosworth and Collins (2008). The same depreciation rate was also used by an IMF study on the GCC countries (Espinoza et al., 2013).

3.7 Minimum Wage: Impacts on Employment and Productivity

In the context of labour demand theory, the *Nitaqat* policy increases the cost on firms, similar to the minimum wage policy. Therefore, exploring the literature on the impact of minimum wages on employment and productivity gives some insight into the impact of such policies.

When the minimum wage laws were first legislated in the United States under the Fair Labor Standard Act in 1938 (Card and Krueger, 1995), the major concern was that they would reduce employment levels, especially for the low skilled. The economic effect of minimum

wage policy is still highly debated within the literature (Machin et al., 2002). The orthodox economic theory of minimum wage impact, arising in the 1980s, suggests that minimum wage has negative effects on employment, albeit at a modest rate, where a 10% increase in minimum wage decreases employment by 1%-3% (Machin et al., 2002, Brown et al., 1982, Lemos, 2009). Meanwhile, more recent literature has argued that minimum wage has little if any effect on employment (Neumark and Wascher, 2007, Brown, 1999). Moreover, Machin (2002) conducted a study on the Care Homes sector in the UK. The UK is more relevant to the work of this thesis as the introduction of the minimum wage for the first time was in 1999. This gives a better indicator on the results as opposed to the US where most studies analyse the rise in the existing minimum wage. Machin (2002) found that there was a reduction in hours and employment within the Care Homes sector. While the previously mentioned studies address policies in developed countries, a more relatable literature would be that studying developing countries. Lemos (2009) concluded that there was no evidence that the minimum wage reduces employment in Brazil, which contradicts the economic theory that raising minimum wage would result in higher unemployment. Jones (1987) studied the impact of minimum wage in an economy with a dual labour market framework[14], and suggests several responses in the primary sector. First, current employees will have higher wages, however, hiring will become costlier and will therefore lead to an increase in unemployment. Secondly, both primary and secondary sectors will have lower employment levels. Thirdly, it will also force labour to become more productive to cover the higher costs which could mean secondary sector employment moving to the primary sector (Jones, 1987) because with higher wages, firms would prefer hiring more skilled, more productive workers, hence increasing employment in the primary sector.

[14] The study was not based on a specific country

Although the minimum wage policy is similar to the *Nitaqat* policy, the literature gives ambiguous results to the minimum wage effect on labour markets. Rebitzer and Taylor (1995) suggests that every labour market is different, and these differences do affect the impact of such policies, therefore they recommend conducting empirical analysis targeted at the specifics of a certain labour market is the best approach.

With the suggestion of recent literature that minimum wage policy has minimal evident impact on reduction in employment levels, and with the higher cost on firms, Forth and O'Mahony (2003) suggest that firms may have reacted by increasing their labour productivity levels to maintain profits after the added costs. Different attempts were made to raise productivity levels, such as greater use of new technology, increased on-the-job training, or changes made to the work organization. Forth and O'Mahony (2003) find that although some low-pay sectors have had accelerated labour productivity, this was not evident at the aggregate level.

The literature suggests that minimum wage increases result in higher productivity both at the firm level and at the macro level. At the firm level, higher productivity must be achieved to stay in the market. Hence, firms might resort to more capital-intensive production technologies in order to reduce labour costs. They might also invest in training programs to improve existing employees' productivity levels. According to Riley and Rosazza-Bondibene (2015), firms raise their productivity by increasing their TFP rather than reducing employment levels or substituting labour with capital. Croucher and Rizov (2012) found increased labour productivity in the UK's low-pay industries as a consequence of the minimum wage introduction. This is even stronger in larger firms. Moreover, at the macro level, the introduction of the minimum wage leads to lower productive firms exiting the

market, therefore raising overall economic efficiency (Mayneris et al., 2014).

To conclude, this chapter has analysed several strands of the relevant literature on issues of labour market, such as labour demand theory, dual labour market and migration. It has also studied the literature of policies that impose added costs on firms such as affirmative action and minimum wage, and their impacts on employment and productivity. The following chapter will analyse the *Nitaqat* policy more in depth.

Chapter 4 Nitaqat

4.1 Introduction

This chapter examines the impact of the *Nitaqat* policy on various firm level outcomes in the private sector of Saudi Arabia. Using a unique administrative dataset developed by the Saudi Arabian Ministry of Labor (MOL), this chapter builds on the work by Peck (2017) to study the impact of the policy between *2012* and *2015,* in terms of its effect on the *Saudization* rate, the firm exit rate, and employment levels for nationals and non-nationals, as well as on total employment and female employment.

4.2 The Dataset

This chapter uses the *Nitaqat* panel dataset that covers the entire Saudi private sector at the firm level since the start of the program in June 2011 until October 2015. The data covers all the population affected by the *Nitaqat* policy consisting of over 1,760,000 firms. The firm-level data were initially collected using weekly observations, but these were then aggregated to the quarterly level in order to make the dataset more manageable. The data were further aggregated to annual intervals. The variables in the dataset are firm size, the industry and the region of the individual firm, and compliance colour. Furthermore, each firm had additional data on number of employees based on nationality and gender.

The panel element of the data provides the opportunity to study the effect of the *Nitaqat* program at the individual firm level, taking into account all the firms that must comply with

it. Having panel data provides the opportunity to control for variations across firms and time (Arellano, 2003) . The ability to test the implications on a large number of data points (over 24 million observations) increases the degrees of freedom and reduces collinearity between independent variables, which improves the efficiency of any regression estimates (Hurlin, 2004).

Moving on to definitions of the variables; the most important variable is the colour assignment variable based on the firm's *Saudization* rate. There are five colours in the dataset; *White, Red, Yellow, Green, and Platinum*. The White firms are the share of firms that are excluded from the policy. The rest of the colours follow a rating system with the Red firms being the least compliant, the Yellow firms having a better compliance than Red but still below the quota, Green being the minimum compliance requirement by the policy, and Platinum having the highest *Saudization* rate. The Green quota is the quota we use, since it is the dividing quota between compliant and non-compliant firms. Although the quotas were not included in the *Nitaqat* dataset, we were able to find them in the *Nitaqat* policy manual[15] (MOL, 2015b). The quotas were then added to the dataset. In 2014, the *Nitaqat* policy was nuanced by further disaggregating the Green category into *low, medium, and high* Green firms. However, in order to maintain consistent data over time, this disaggregation is not exploited in this chapter.

The firm size variable has five classifications based on number of employees; *micro, small, medium, large and giant.* The micro-sized firm have fewer than 10 employees, the small firm size definition consists of firms with between *10* and *49* employees, whereas medium firms

[15] Table included in Chapter 2, Appendix 2.A, Table 2.2.

contain between *50* and *499* employees. Large firms have *500* to *2,999* employees and giant firms have *3,000* employees or more. The micro sized category has existed in the dataset since *2011,* however, these firms were not included in the policy treatment until *2014*. Furthermore, there were 50 different industry classifications covering the entire private sector.

The *Saudization* quota requirement was based on a matrix of these three variables; industry by size by colour[16]. This means that within the same industry, the requirement quota changes by size of the firm. For example, in the manufacturing industry, the minimum quota requirement for small firms is an 8% *Saudization* rate, while giant firms in the manufacturing industry have a 20% *Saudization* rate quota. Additionally, the quota requirement also changes based on industries, for example the communication industry has a 20% quota for small firms, while the construction industry has only a 5% quota for the same size small firm category. The matrix was crucial for the policy to work, as it allows for industry and size variability which makes the quotas more attainable across the private sector. Leonard (1985) has suggested that controlling for size, industry and region is important when analysisng policies such as affirmative action. When looking at the policy in Saudi Arabia, the old *Saudization* policies did not consider these dimensions. However, the *Nitaqat* policy did control for size and industry. A regional control was not necessary in Saudi Arabia as the system is centralised; therefore, regional control is already included in the policy.

The *Saudi* variable reports the number of Saudis in each firm, whilst the *foreigner* variable indicates the number of foreigners in each firm. The dataset also collects information on the

[16] Table included in Chapter 2, Appendix 2.A, Table 2.2.

number of males and females in each firm. Part of the analysis performed in this chapter used the exit and entry rates of firms in each year. This was achieved by dividing the dataset into five sub-samples for each year. The current year was then merged with the previous year, and the exit and entrance variables were then generated.

Before the implementation of the *Nitaqat* policy in 2011, the Saudi MOL did not hold such detailed data on firms or employment as the data was scattered between different governmental organisations. During the implementation of *Nitaqat*, the collection of data began on June 11th, 2011. The MOL resorted to the GOSI to gather information on Saudi employees, as every worker is required to register with them. Data of foreign labour was obtained from the Ministry of the Interior (MOI). The Saudi MOL collected detailed firm level data in order to track each individual firm's performance and study the impact of the policy on the labour market. This has provided a good measurement tool to study *Nitaqat* as well as other policies and changes occurring in the labour market. Peck (2017) was the first to use the newly developed *Nitaqat* dataset on firms. The period of analysis studied by Peck (2017) ends in October 2012. Consequently, the data used in this chapter between November of 2012 and October of 2015 has not been analysed before, as well as the use of female data.

4.2.1 Descriptive Statistics

This chapter starts with some descriptive statistics showing the different trends in the obtained dataset, before moving on to econometric analysis.

Table 4.1: Share of Firm movement between colours or exit across time*

Starting colour	*Ending Colour*					
	Red	Yellow	Green	Platinum	Exited	Total
2011			**2012**			
White	-	-	-	-	-	-
Red	13.11	5.92	22.87	0.85	30.10	72.84
Yellow	0.63	1.10	5.17	0.13	5.54	12.57
Green	0.61	0.94	7.55	0.55	3.79	13.44
Platinum	0.02	0.03	0.34	0.50	0.27	1.15
Total	14.37	7.99	35.92	2.02	39.69	100.00
2012			**2013**			
White	-	-	-	-	-	-
Red	2.33	1.60	13.68	0.58	28.98	47.16
Yellow	0.63	0.73	5.81	0.16	8.91	16.25
Green	0.69	0.94	18.82	1.16	12.24	33.85
Platinum	0.03	0.06	1.27	0.90	0.49	2.75
Total	3.67	3.32	39.58	2.80	50.63	100.00
2013			**2014**			
White	30.61	0.00	49.51	0.00	8.79	88.91
Red	0.19	0.06	0.42	0.03	2.03	2.73
Yellow	0.04	0.07	0.51	0.02	0.85	1.49
Green	0.13	0.21	3.24	0.19	2.51	6.28
Platinum	0.02	0.01	0.21	0.13	0.23	0.60
Total	30.99	0.34	53.90	0.36	14.40	100.00
2014			**2015**			
White	15.92	0.00	65.71	0.00	6.52	88.16
Red	0.11	0.04	0.21	0.02	0.47	0.85
Yellow	0.01	0.04	0.48	0.02	0.39	0.94
Green	0.04	0.18	6.43	0.38	2.47	9.52
Platinum	0.00	0.01	0.32	0.03	0.18	0.53
Total	16.09	0.27	73.15	0.45	10.03	100.00

*The actual number of firms on which this table is based are included in Appendix 4.A, Table 4.8.

Table 4.1 describes the movement of firms across colours and time. The columns represent the colours of the firms at the end of the previous year (t-1), while the rows represent the percentage of firms that moved by the end of the year. The White category contains micro sized firms with fewer than 10 employees. This category was excluded from the table in 2012

and 2013 as they were exempt from the policy at the time. They were then added in 2014 and 2015. As explained in Chapter 2, Red and Yellow firms are the target of the *Nitaqat* policy since they represent lower *Saudization* rates that do not meet the minimum quota. Both Red and Yellow firms face sanctions if they stay in their categories and will be forced to either upgrade to the Green colour or to exit the market eventually.

Table 4.1 further shows that in 2012 almost 23% of firms moved from Red to Green during the first year. Around 6% upgraded to the Yellow category, whilst 13% remained in the Red category and faced the sanctions of *Nitaqat*. The `Exited' column indicates the percentage of firms that exited the market based on their initial colour. This shows that 30% of exiting firms were in the Red category. In 2012 the Red firms made up around 73% of total firms under the *Nitaqat* policy. However, *Nitaqat* also targeted Yellow firms and they formed almost 13% of total firms in 2012. The table shows that 5.5% of firms that were in the Yellow category had to exit the market in 2012. Yellow and Red firms had an exit rate of 44% and 41%, respectively. When we look at the movement of Yellow firms in 2012, around 5% were able to upgrade to the Green category while 1% remained in the Yellow band. The Green group showed the highest increase of firms at around 36%. This is not surprising given the goal of the policy was to move firms to at least the Green colour. The table shows high compliance rates for firms since firms from both colours tend to upgrade. Moreover, an exit rate of 40% suggests that the sanctions may have been too harsh and that firms could not survive if they did not comply.

In the second year of the policy, 2013, the pattern looks very similar. It is interesting to see that by the end of the year the Red and Yellow groups contain only 3% of total firms each. This reflects how effective and fast this policy was in forcing the non-compliant firms into

the minimum requirement. The share of total firms in the minimum requirement group (Green) continued to rise reaching around 40% in 2013. Also interesting, the exit rate of the Green band also increased by around 8% when compared to the previous year (12.24% compared to 3.79%). This could suggest that firms which upgraded to Green status in the first year, struggled to meet the extra costs in terms of higher wages for Saudis, even though they were not facing sanctions. This could indicate that firms could not endure the higher costs indefinitely. The exit rate increased by 10% in 2013 to reach almost 51% of total firms, suggesting that the majority of firms exited the market. The trends indicate that there are major changes in the private sector, and exit rates are at alarmingly high rates. Further econometric analysis is required to fully attribute these trends to the *Nitaqat* policy.

In 2014, the *Nitaqat* policy started the implementation of stage three of the program[17] by adding the micro sized firms to the treatment group. The number of firms adhering to the policy grew almost seven-fold, from around 260,000 firms in 2012, to over 1.7 million in 2014. The coverage incorporates the entire private sector at this point. The policy has allowed the Saudi business owners of micro sized firms to register as Saudi employees to help achieve the quota, provided that they are not registered already as an employee in another firm. This is important as shown in Table (4.1), since in 2014 over 30% of firms were added to the Red category, which may indicate that the owner of the firm was registered as an employee somewhere else and could not be upgraded to Green status. Table 4.1 also shows that almost 50% of firms were compliant and moved to the Green category. Around 9% of firms that exited were from the White category, whilst total exits decreased significantly from 51% in 2013 to 14% in 2014. These two combined observations suggest that firms were adjusting to

[17] Discussed in Chapter 2

the policy. By 2014, 54% of all firms were in the Green group.

Finally, in 2015, 15% of firms that were in the White category had moved to the Green category, indicating that 73% of private sector firms were Green in 2013. The exit rates declined to 10%, the lowest since the start of the policy. The raw data suggest that the *Nitaqat* policy had a high impact on the composition of the labour market, but further econometric analysis is needed to rule out any other potential drivers.

One of the main aims of the *Nitaqat* policy is to increase the *Saudization* rate in the private sector. Hence, it is important to look at the trend of Saudi employment growth and *Saudization* in the dataset in order to evaluate the success of the policy.

Table 4.2: Number of Saudi employees and percentage growth.

	2011	*2012*	*2013*	*2014*	*2015*
Number of Saudis	339,359	784,591	945,310	1,038,856	1,142,170
Growth of Saudis		131.20	20.48	9.90	9.94

Table 4.2 provides the number of Saudi employees and the annual percentage growth between 2011 and 2015. The largest increase in Saudi employment occurred in the first year, with 131.20% growth in the number of Saudi employees. In the following year, the growth was much lower at 20.50% and it declined further (although remaining positive) reaching less than half the value in 2014 and 2015. However, the total growth across the whole 4-year period was 236.57%, which is almost twice the size of that which occurred in the first year.

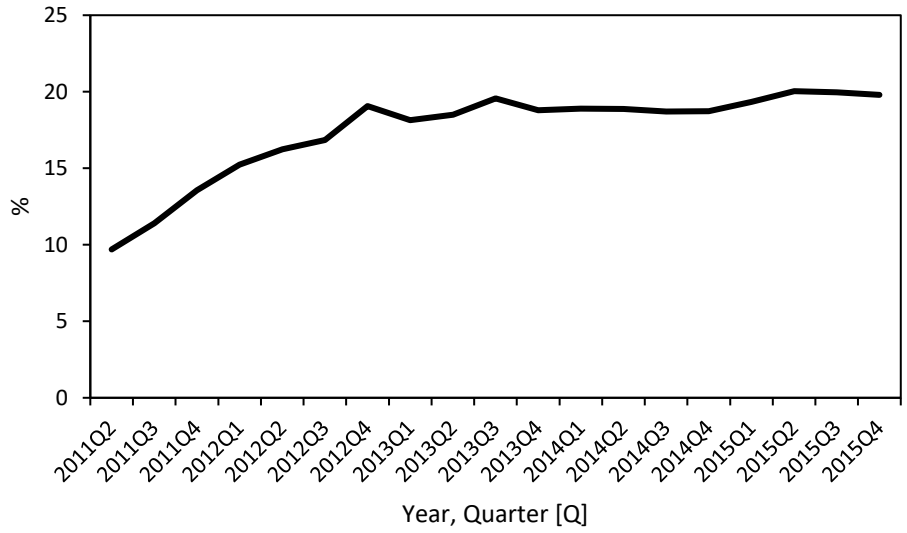


Figure 4.1: Percentage of Saudis to Total Employment per Quarter

Figure 4.1 denotes the growth in *Saudization* per quarter, where *Saudization* is the proportion of total employment that are Saudi nationals. This shows a positive growth trend over each quarter between the second quarter of 2011 and the final quarter of 2015. At the start of the program in 2011, Saudis comprised of only 9.69% of total private sector employment. After 16 months of *Nitaqat* implementation, the growth of Saudi employment seemed to stop. By the fourth quarter of 2012 *Saudization* had reached 19%. After 2012, there was some growth but this was at a decreasing rate. There was 20% Saudi employment in the private sector in 2015. Figure 4.1 suggests that the growth of Saudi employment happened within the first 12 to 16 months of the policy implementation, with little growth after that. However, further investigation is needed to determine whether the program was the cause of these changes or whether there were other external factors involved.

4.2.2 Strategic Downsizing

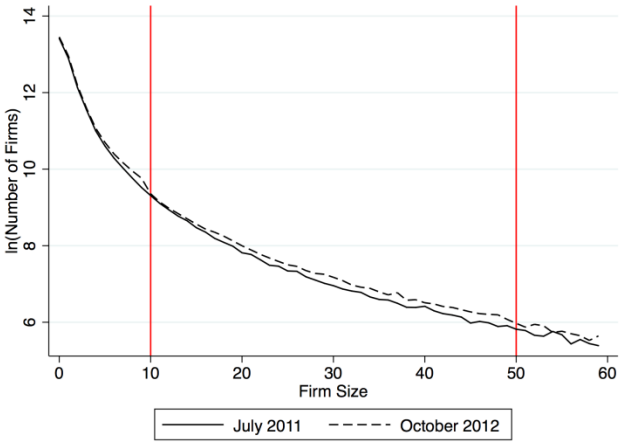


Figure 4.2. Relationship of number of firms and size July 2011 and October 2012

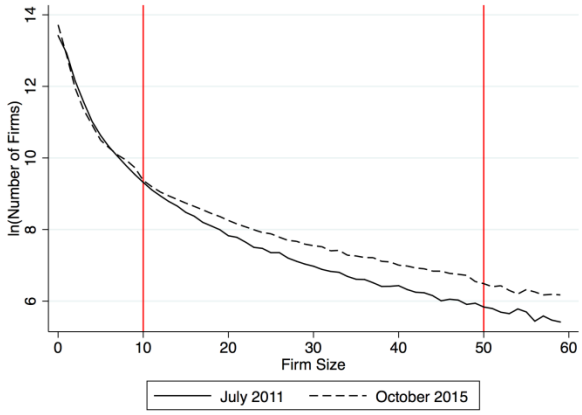


Figure 4.3. Relationship of number of firms and size July 2011 and October 2015

Peck (2017) found that there was a trend of strategic downsizing amongst firms to either less than ten employees or smaller size categories to adhere to lower quota requirements. Figures 4.2 and 4.3 plot the size and number of firms in the small-sized category which is between 10 to 49 employees represented by the two red vertical lines. One way in which firms could minimise the impact of *Nitaqat* was by either reducing their size to below the ten-employee

cut-off in order to become exempt from the *Nitaqat* policy, or to downsize to the lower size category where they are held at a lower quota requirement. It appears that firm size did not change radically from the original pattern in 2011. Figure 4.5 suggests that firms in October 2015 decreased in size, on average. The dotted line suggests an increase in small-sized firms. The gap between the two lines is increasing indicating growth in the number of firms that are downsizing to the smaller size category in order to achieve a smaller quota requirement**.**

4.2.3 Exit rates by Firm Size and Colour

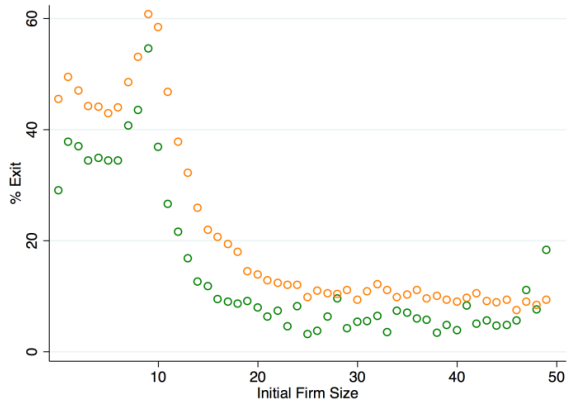


Figure 4.4: Exit rates by firm size and colour 2012

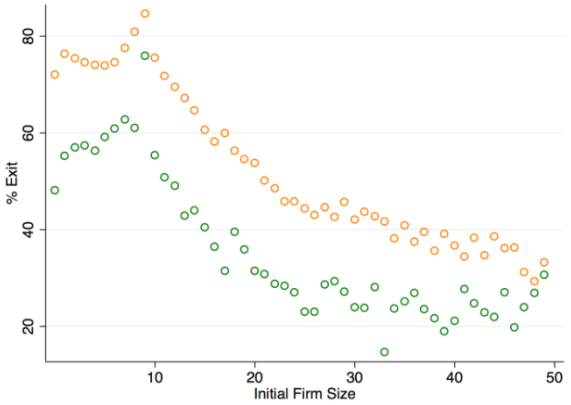


Figure 4.5. Exit rates by firm size and colour 2015

Figure 4.4 and Figure 4.5 contain the exit rates for firm size by colour in 2012 and 2015. There is a clear negative relationship between exit rates and firm size, since the exit rate is higher in smaller-size firms than it is with larger firms, in both 2012 and 2015. Comparing the two figures also shows an increase in the exit rates in 2015 compared to 2012, with Yellow and Red, firms (represented by the orange dots) exhibiting higher exit rates than the Green ones. This suggests a larger impact of the policy on the treated firms.

4.3 Methodology

The main aim of this section is to determine the causal effect of *Nitaqat* on employment and firms. The methodology used draws upon Peck's (2017) difference-in-differences (DID) methodology. However, due to differences in the two datasets, the results presented here, which use the same time period as Peck (2017), are close but not exactly the same. Peck (2017) uses data collected from the MOL and GOSI, which is then aggregated into one dataset. The dataset used for this chapter is a more comprehensive and aggregated dataset from the MOL alone.

Peck (2017) uses a DID approach to compare the relative transformation of Red, Yellow and Green firms within the same industry and size. This section builds on Peck (2017) by studying the impact of *Nitaqat* five years after its implementation using the DID methodology[18].

DID is frequently used for evaluating natural experiments such as the effect of a policy introduction. The approach usually uses observations from before and- after the implementation of the policy. However, due to a lack of data before the policy implementation, we will use the base year '2011'. This is when the data was first collected although the policy had not been implemented. This will be compared with the 'after' period. This is considered to be the first difference. The second difference compares the treated group with an untreated group. These two differences are then compared to provide DID

[18] Peck (2017) also used a "Regression Kink Design" approach to estimate the impact of the program on employment, the value of the firm, its size and exit rate. We will not be using this approach in this study as it only measures a one-off impact effect and this thesis focusses on changes over time.

(Bertrand et al., 2004). The DID approach is based on an OLS regression framework. The DID also requires that there are parallel trends in the treatment and control groups. This means that, if the treated variable was never treated, it will follow a parallel trend with the control group. In this particular application the treatment and control group were the same before the policy since the allocations of firms into colour groups only appeared with the introduction of the policy. This is shown in Figure 4.6 below.

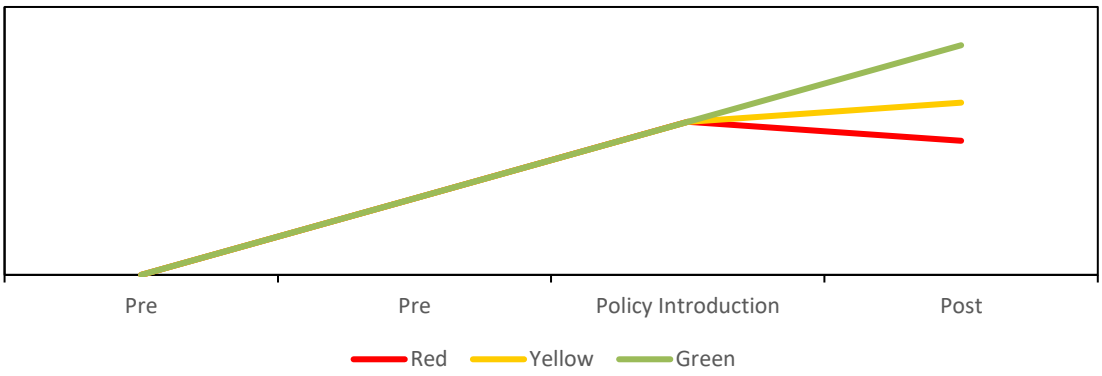


Figure 4.6: Parallel Trend Assumption

The Difference-in-differences model presented by Peck (2017) uses the following specification:

$$\Delta Y_{ijs} = y_1 D(Red)_{ijs} + y_2 D(Yellow)_{ijs} + \alpha_{js} + \epsilon_{ijs} \quad 4\text{-}1)$$

Where:

i =	Individual firm
j =	Individual Industry
s =	Size category
ΔY_{ijs}=	The change in outcome variables; *Saudization*; employment; and exit rate, per individual firm per industry per size.
$D(Red)_{ijs}$=	Dummy of the first treatment group; Red firms, per individual firm per industry per size, measured against the Green firms as the control group.
$D(Yellow)_{ijs}$ =	Dummy of the second treatment group; Yellow firms, per individual firm per industry per size, measured against the Green firms as the control group.

However, this chapter will use the Difference-in-Differences model (4-2) that is presented by Angrist and Pischke (2008), Specification (4-2) compares the treated firms in the Red and Yellow categories to all firms in the Green colour band, conditional on industry and firm size using the following equation:

$$\Delta Y_{ijst} = \alpha_{js} + \gamma TC_{js} + \lambda d_t + \beta_1 (TC_{js}.d_t) + \varepsilon_{ijst} \quad 4\text{-}2)$$

Where:

ΔY_{ijst} =	the change in outcome variable per individual firm, industry and size at time t.
γTC_{js}=	the treatment colour group 'Red' and 'Yellow' measured against the control group 'Green', i.e. $\gamma_{Red} - \gamma_{Green}$, $\gamma_{Yellow} - \gamma_{Green}$.
λd_t =	the time trend, measuring the after period 't' representing the years 2012, 2013, 2014, and 2015, against the before, in this case it is constant at the 2011 base year, i.e. $\lambda_{11} - \lambda_{12}$,.., $\lambda_{11} - \lambda_{15}$.

$(TC_{js}.d_t)$ = the interaction variable where the previous two variables are subtracted $(\gamma_{Red} - \gamma_{Green}) - (\lambda_{11} - \lambda_{12})$ to produce the difference-in-differences results.

ε_{ijst} = the error term.

It is important to note that the model is measured against the Green firms as the control group.

Furthermore, eight outcome variables (ΔY_{ijs}) will be used in this section of this chapter; *Saudization rate, Saudi Percentage, Saudi Employee, Foreign Percentage, Foreign Employee, Total Employee Percentage, Total Employees,* and *Exit Rate.* The *Saudization* is defined as the growth percentage of Saudis in relation to total employment in an individual firm. It is the main target of the policy. *Saudi Percentage* is the growth of the Saudi employee percentage in a given firm. *Saudi Employee* is the growth of the actual number of Saudi employees in a firm. *Foreign Percentage* is the growth of the foreign employee percentage in a given firm. *Foreign Employee* is the growth of the actual number of foreign employees in a firm. *Total Employee Percentage* is the growth of the total employee percentage in a given firm. *Total Employees* is the growth of the actual number of total employees in a firm. And lastly, the *Exit Rate* is the percentage growth of firms exiting the labour market.

Peck (2017) studies the program until 2012. The aim of this chapter therefore, is to investigate the longer-term effects by including data up to 2015. This will allow us to examine the impact of the policy on a range of economic outcomes four years after its implementation, and determine whether the effect was a one-time shock? Or has it had a lasting impact over time?

4.4 Results and Analysis

This section will start by first presenting the results of the specifications discussed in the methodology before conducting several robustness checks to verify the results. Lastly, it will attempt to analyse the impact of *Nitaqat* on female employment in Saudi Arabia.

Table 4.3 uses the DID approach using equation 4-2 with base year of 2011. Results are presented below.

Table 4.3: DID results using base year 2011, equation 4-2)

	2012	***2013***	***2014***	***2015***
Saudization				
D(Red)	8.27***	10.24***	10.16***	10.43***
	(0.56)	(0.857)	(0.837)	(0.79)
D(Yellow)	4.85***	5.89***	5.67***	5.93***
	(0.42)	(0.478)	(0.485)	(0.50)
N	154,616	96,704	82,763	74,559
Saudi Employees				
D(Red)	1.10**	0.53	0.26	0.17
	(0.378)	(0.35)	(0.394)	(0.527)
D(Yellow)	0.96**	0.50	0.33	0.63
	(0.312)	(0.306)	(0.349)	(0.514)
N	154,616	96,704	82,763	74,559
Foreign Percentage				
D(Red)	-15.34**	-38.74***	-42.79***	-44.59***
	(0.045)	(0.070)	(0.0612)	(0.059)
D(Yellow)	-12.76**	-35.53***	-42.06***	-44.17***
	(0.04)	(0.106)	(0.096)	(0.102)
N	154,616	96,704	82,763	74,559
Foreign Employees				
D(Red)	-5.10***	-13.40**	-16.16**	-18.00*
	(1.4)	(4.4)	(5.812)	(7.07)

D(Yellow)	-2.77***	-8.85***	-11.51**	-9.92*
	(0.71)	(2.57)	(4.01)	(3.77)
N	154,616	96,704	82,763	74,559
Total Employment Percentage				
D(Red)	-14.51***	-38.27***	-41.22***	-42.54***
	(0.034)	(0.064)	(0.0635)	(0.066)
D(Yellow)	-9.13*	-33.21**	-33.88***	-34.38*
	(0.039)	(0.105)	(0.99)	(0.108)
N	154,616	96,704	82,763	74,559
Total Employees				
D(Red)	-4.00***	-12.86**	-16.13**	-17.83**
	(1.21)	(4.463)	(6.01)	(7.256)
D(Yellow)	-1.82**	-8.34***	-11.47***	-9.29**
	(0.61)	(2.51)	(4.12)	(3.792)
N	154,616	96,704	82,763	74,559
Exit Rate				
D(Red)	10.10***	17.24***	15.94***	14.95***
	(1.052)	(1.40)	(1.312)	(1.25)
D(Yellow)	14.71***	17.10***	16.19***	14.63***
	(1.42)	(1.78)	(1.68)	(1.60)
N	257,182	257,182	257,182	257,182

Note: *p<0.1, **p<0.05, ***p<0.01, Standard Errors are reported in parenthesis
Data Source: Nitaqat Dataset, MOL
*It is important to note that the coefficients presented in table 4.3 represent the difference-in-differences result of the interaction term in equation 4-2. Moreover, the coefficients of the treatment groups, Red and Yellow, are relative to changes in the control group, the Greens.

Saudization

The first outcome variable analysed is the *Saudization* rate, which is the share of Saudis to the total employment per firm. This refers to equation 4-2 and the results are presented in the first panel of Table 4.3. The coefficients measure the change in *Saudization* since the beginning of the program. All the results are highly significant at the 99% level. In 2012, there was an increase of 8.27% in *Saudization* rates as a consequence of the policy for Red firms. The coefficient continues to rise reaching over 10% for the following three years. In general, the change is positive and converging to a constant level for both the Red and

Yellow firms.

The policy had a lower impact on the *Saudization* levels of Yellow firms. The change was 4.85% in the first year, rising by one percentage point in 2013. It then ranges from 5% to 6%. The *Saudization* levels seem to experience a shock in the first year, but then they remain fairly constant in later years. This could suggest that the policy needs to be amended if it is to achieve any longer-term impact, as seen in 2013, where the different levels of Green were introduced to raise the quota level higher.

Saudis

The results for equation 4-2, when Y_{ijst} captures Saudi employment, are presented in the second panel of Table 4.3. For Red firms, the effect of the policy on Saudi employees was statistically significant at the 95% level in the first year of application since the table shows a 1.10 increase in Saudi employees per firm. The table also shows a positive increase of around one Saudi employee for Yellow firms. However, in later years, the effects of the policy are not statistically significant. This suggests that the policy provided an instant shock whereby it forced firms to employ Saudis right away. However, the policy had less impact on Saudi employment as time went on. This is probably due to the adjustment of the firms to the policy as suggested by Peck (2017) and confirmed earlier in this chapter (Figure 4.3). Firms appear to be shrinking in size by laying-off foreign workers to achieve the higher quotas. This is also supported by the summary statistics of the Saudi variable discussed earlier (Table 4.1), where it showed the growth in Saudi employment was around 131% in 2012, yet it has dropped sharply in the following years reaching 20% in 2013, and 9% in 2014 and 2015. This provides further evidence that the policy was highly effective in 2012, yet with time, the effect seems to decline.

Foreigners

a. Foreigners' Percentage Change

The results for equation 4-2, when Y_{ijst} captures the change in foreign (non-Saudi) employees are presented in the third panel of Table 4.3. The coefficients quantify the change in the foreign (non-Saudi) employee percentage in the Saudi labour market after the policy implementation. With foreigners forming around 90% of the private sector prior to 2011, the impact was highly significant. Using the base year of 2011, the initial impact was a decrease of 15.34% in foreign employees in the Red firms in the first year. The policy continues to affect the change in foreign (non-Saudi) employees and the coefficients jump to more than double in 2013 with -38.74% and even -44.59% in 2015. As for the Yellow firms, the impact follows a similar trend starting with a 12.76% decrease in foreign employment in 2012. The coefficients continue to rise reaching a fall of 44.17% in foreign employment in 2015. It is the largest effect of all the outcome variables studied.

b. Foreigners' Employees Change

The fourth panel of Table 4.3 presents the results for equation 4-2, when Y_{ijst} captures the employee change of foreigners in the economy. The results show huge effects for the policy. For Red firms, the fall is around 5 employees fewer in 2012 than in 2011. This decrease continues and reaches 13 employees fewer, before continuing to decline to 18 employees fewer, relative to 2011. The results for Red firms seem to be highly significant in the first year but then the significance level decreases with time. Standard errors also increase over time with less efficiency in the estimates. The coefficients for the Yellow firms follow a similar pattern. However, in 2015, the change declines by around 10 employees compared to the previous year of 11 foreign employees fewer per Yellow firm. This suggests that the impact of the policy declines over time for Yellow firms.

Total Employment

The fifth and sixth panels of Table 4.3 present the results for equation 4-2, when Y_{ijst} measures total employment in terms of percentage as well as levels. Total employment consists of both Saudis and foreigners. Since 90% of Saudi employment in the private sector is foreign, the trends are similar to those observed in the panels three and four. The results indicate a significant decline in employment levels from -14.5% in 2012 to -42.5% in 2015. As the *Nitaqat* policy imposes wage costs on private sector firms it can be thought of as having a similar effect as the imposition of a minimum wage. As discussed in Chapter 3, the literature on minimum wage effect is inconclusive. Classical labour demand theory suggests that a higher cost, such as an imposition of minimum wage, results in reduced employment levels (Brown et al., 1982; Machin, 2002). Whilst more recent studies such as (Card and Krueger, 1994; Neumark andWascher, 2007; Lemos, 2009) find no evidence of a negative employment effect for minimum wages. The results of this chapter support the classical labour demand theory suggesting a decline in employment levels, however, in this case the decrease in employment levels is significantly higher than those observed in the literature.

Exit Rates

The final panel in Table 4.3 presents the results for equation 4-2, when Y_{ijst} measures the percentage of firms exiting the market. In the first instance, we use 2011 as the base year and measure the impact relative to the following years.

In 2012, one year after the policy was introduced, there is a 10.10% increase in Red firms exiting the market. This is statistically significant at the 99% level. Hence, the results suggest the policy had a major impact on firms in the Red category. The exit rate continues to rise,

reaching its highest level of 17.24% in 2013. It then starts to decrease slightly in following years to reach 14.95% in 2015.

The coefficients for Yellow firms are generally larger. In 2012, the policy led to a 14.71% increase in exit rate of Yellow firms relative to a 1% increase in the exit rate of Green band firms. The policy is also highly significant for Yellow firms. The exit rate of yellow firms continued to increase reaching 17.10% in 2013 which is the maximum level. It then starts to decline in the next two years reaching 14.63% in 2015. This implies that both Red and Yellow firms were affected by the policy, but also that the effect was temporary. This might suggest that firms were able to adjust to better colour ratings, as well as gaining the ability to adjust to the policy with time which has decreased the exit rate.

Overall Trend: Difference-in-Differences with base year 2011

Although *Saudization* is increased over time, the results suggest that this is due to the significant decline in foreign employment rather than the rise of Saudi employment. This is supported by the insignificant effect of the policy on Saudi employment after 2012. Foreign employment in the private sector formed 90% of total employment in 2011, which was reduced as a result of the policy falling to 81% in 2015. This is supported by the findings on reduction of total employment; where it followed a parallel trend with foreign employment.

4.4.2 Robustness Check: Change in Treatment Groups

The main assumption of DID is the parallel trend of the treated and control groups prior to the policy introduction. The fact that treated and control were one variable before the policy

implementation supports this assumption (Figure 4.6).

Furthermore, to check the robustness of our methodology, we conducted a placebo DID analysis where Green firms well above the cut-off quota were added to the treatment group in the second model to allow for a fair analysis of the program; leaving Green firms with five or less Saudi employees above the cut-off as the control group. Therefore, Green firms with more than five Saudi employees above the cut-off were added in the second specification as a treatment group.

$$\Delta Y_{ijs} = \alpha'_{js} + \gamma'_1 D(Red)_{ijs} + \gamma'_2 D(Yellow)_{ijs} + \gamma'_3 D(Green > 5)_{ijs} + \epsilon'_{js} \qquad 4\text{-}3$$

Again Y_{ijs} is the range of outcome variables summarised in the methodology section by firm i, industry, j, and size, s. Each outcome variable is presented in Table 4.4 showing how the results change over time by estimating separate regressions each year and by colour separately. All regressions include fixed effects of industries by size. The results use 2011 as the base, which is the year that the *Nitaqat* program started.

Table 4.4: DID results using base year 2011, equation 4-3

	2012	*2013*	*2014*	*2015*
Saudization				
D(Red)	8.16***	10.07***	10.01***	10.26***
	(0.54)	(0.836)	(0.819)	(0.77)
D(Yellow)	4.71***	5.67 ***	5.46***	5.57 ***
	(0.41)	(0.455)	(0.474)	(0.49)
D(Green>5)	-3.12***	-3.91***	-3.51**	-3.63**
	(0.77)	(0.988)	(1.087)	(1.04)
N	154,616	96,704	82,763	74,559
Saudi Percentage				
D(Red)	75.67**	85.69**	80.56*	95.94**
	(0.25)	(0.30)	(0.32)	(0.35)

D(Yellow)	21.38*	22.82*	24.55	33.42*
	(0.11)	(0.14)	(0.16)	(0.16)
D(Green>5)	-73.58***	-96.10***	-98.77**	-108.28***
	(0.15)	(0.26)	(0.32)	(0.30)
N	154,616	96,704	82,763	74,559
Saudi Employees				
D(Red)	0.80**	0.567*	0.229*	0.26
	(0.253)	(0.325)	(0.368)	(0.502)
D(Yellow)	0.58**	0.543	0.296	0.75
	(0.194)	(0.387)	(0.499)	(0.604)
D(Green>5)	-8.34*	0.746	4.543	1.86
	(3.44)	(2.879)	(3.696)	(3.57)
N	154,616	96,704	82,763	74,559
Foreign Percentage				
D(Red)	-15.50**	-39.03***	-41.44***	-42.11***
	(0.045)	(0.070)	(0.064)	(0.067)
D(Yellow)	-12.96**	-35.90***	-40.33***	-41.00***
	(0.041)	(0.106)	(0.101)	(0.107)
D(Green>5)	-3.88	-6.14	28.03	49.32
	(0.035)	(0.086)	(0.269)	(0.571)
N	154,616	96,704	82,763	74,559
Foreign Employees				
D(Red)	-4.12***	-10.09**	-11.66*	-12.19*
	(1.12)	(3.349)	(4.481)	(5.52)
D(Yellow)	-1.57	-4.65	-5.68	-2.41
	(0.96)	(3.286)	(4.729)	(5.67)
D(Green>5)	-26.87*	74.44*	100.7*	123.90*
	(12.63)	(38.07)	(49.1)	(64.67)
N	154,616	96,704	82,763	74,559
Total Employment Percentage				
D(Red)	-15.54***	-41.56***	-45.46***	-47.07***
	(0.034)	(0.073)	(0.086)	(0.087)
D(Yellow)	-10.42*	-37.41***	-39.38***	-40.25***
	(0.041)	(0.111)	(0.114)	(0.116)
D(Green>5)	-24.30***	-68.81	-87.82	-90.01
	(0.069)	(0.422)	(0.686)	(0.617)
N	154,616	96,704	82,763	74,559
Total Employees				
D(Red)	-3.33**	-9.52**	-11.43**	-11.92**

	(1.04)	(3.43)	(4.676)	(5.82)
D(Yellow)	-0.99	-4.11	-5.386	-1.66
	(0.97)	(3.49)	(5.05)	(6.06)
D(Green>5)	18.54	75.19*	105.24*	125.76
	(11.27)	(39.17)	(50.78)	(65.37)
N	154,616	96,704	82,763	74,559
Exit Rate				
D(Red)	9.92***	16.95***	15.718***	14.65***
	(1.084)	(1.48)	(1.379)	(1.33)
D(Yellow)	14.49***	16.76***	15.93***	14.28***
	(1.48)	(1.89)	(1.773)	(1.73)
D(Green>5)	-6.62**	-10.43***	-7.91**	-10.79***
	(2.423)	(2.83)	(3.36)	(2.79)
N	257182	257182	257182	257182

Note: *p<0.1, **p<0.05, ***p<0.01. Standard Errors are reported in parenthesis
Data Source: Nitaqat Dataset, MOL

The results shown in Table 4.4 support the results presented in Table 4.4.1 since the overall trends observed are the same. They show a statistically significant positive relationship between the *Nitaqat* policy and *Saudization* rate, with a higher effect on exit rates, for both Red and Yellow firms.

Moreover, the addition of the Green firms with more than five Saudi employees shows a trend opposite to expectations, since these firms are receiving benefits instead of sanctions. In these firms the number of foreign and total employment is rising demonstrating that the country was enjoying economic growth at the time of the policy and an increase in the demand for foreign labour. Exit rates were negatively affected by the policy for the Green band and this is further proof of how the policy is affecting Red and Yellow firms.

4.4.3 Robustness Checks: Lagged OLS Regression

In order to further test the validity of our results, one more specification was estimated, using equation 4-2 however changing the base year from 2011, to (t-1) instead. The aim here is to measure the effect of the policy on entrants and exiting firms, as well as the year-on-year change.

Table 4.5: DID results using base year (t-1), equation 4-2

	2012	2013	2014	2015
Saudization				
D(Red)	8.27***	10.44***	8.93***	9.25***
	(0.56)	(0.615)	(0.401)	(0.525)
D(Yellow)	4.85***	5.02***	5.305***	6.22***
	(0.42)	(0.336)	(0.264)	(0.346)
N	154,616	85,244	90,955	133,027
Base Year	2011	2012	2013	2014
Saudi Percentage				
D(Red)	81.37**	14.95*	-4.41	-14.63***
	(0.26)	(0.08)	(0.03)	(0.04)
D(Yellow)	29.05**	43.17***	-7.67	9.15**
	(0.09)	(0.09)	(0.05)	(0.03)
N	34,205	44,449	66,483	108,135
Base Year	2011	2012	2013	2014
Saudi Employees				
D(Red)	1.10**	-0.17	-0.66*	-0.40**
	(0.378)	(0.23)	(0.30)	(0.11)
D(Yellow)	0.96**	0.23	-0.65*	-0.12
	(0.312)	(0.56)	(0.38)	(0.14)
N	154,616	85,244	90,955	133,027
Base Year	2011	2012	2013	2014
Foreign Percentage				
D(Red)	-15.34**	-29.62***	-29.84***	-14.29***
	(0.045)	(0.044)	(0.054)	(0.019)
D(Yellow)	-12.76**	-37.47**	-27.99***	-11.33**

	(0.04)	(0.125)	(0.061)	(0.037)
N	126,726	77,898	82,804	124,233
Base Year	2011	2012	2013	2014
Foreign Employees				
D(Red)	-5.10***	-14.19**	-15.16**	-5.51*
	(1.4)	(4.53)	(5.566)	(2.24)
D(Yellow)	-2.77***	-15.46**	-10.08*	-3.37*
	(0.71)	(4.51)	(4.30)	(1.40)
N	154,616	85,244	90,955	133,027
Base Year	2011	2012	2013	2014
Total Employment Percentage				
D(Red)	-14.51***	-28.19***	-30.97***	-18.42***
	(0.034)	(0.046)	(0.053)	(0.028)
D(Yellow)	-9.13*	-32.32*	-28.69***	1.00
	(0.039)	(0.129)	(0.067)	(0.151)
N	128,339	78,772	83,921	125,827
Base Year	2011	2012	2013	2014
Total Employees				
D(Red)	-4.00***	-14.37**	-15.83**	-5.904*
	(1.21)	(4.71)	(5.85)	(2.32)
D(Yellow)	-1.82**	-15.23**	-10.73*	-3.49*
	(0.61)	(4.63)	(4.62)	(1.51)
N	154,616	85,244	90955	133,027
Base Year	2011	2012	2013	2014
Exit Rate				
D(Red)	10.10***	21.30***	29.09***	25.75***
	(1.052)	(2.04)	(2.4)	(4.08)
D(Yellow)	14.71***	16.91***	15.09***	12.88***
	(1.42)	(2.5)	(1.75)	(1.22)
N	257,182	175,910	186,916	188,646
Base Year	2011	2012	2013	2014

Note: *p<0.1, **p<0.05, ***p<0.01. *Standard Errors are reported in parenthesis*
Data Source: Nitaqat Dataset, MOL

As the previous year is used as the base category, the sample size for each sample after 2011 falls over time as more firms leave the sample, either by exiting the market completely or

through upgrading their colour status. Moreover, the effect of the policy continues to increase over time for all of the outcome variables. This suggests that the policy has a lasting impact, as the trend is still highly significant and increasing in *Saudization* and exit rates, whilst reducing foreign employment and total employment. However, by 2015, the policy begins to have less of an effect. The results are still highly significant but with the inclusion of micro sized firms in 2015, the results were declining for most variables.

Looking at different variables individually; the DID analysis of 2011 as the base year shows either a positive or a negative linear growth, except for the exit rate variable in 2015. This showed a fall. Other than that, all variables followed the same trend. The (t-1) model gives a clearer picture of the annual change. Most variables, except for *Saudization*, peaked in 2014, suggesting that the policy has continued to impact the market up until that year. In 2015, the figures decline to almost half the effect. This could be a result of several factors; firstly, in 2014 the policy changed to include all micro firms (less than 10 employees). Hence, the results were only observable in 2015 because both (t-1) and (t) had the micro firms. Another possible factor is that after four years of the policy, as results have shown a constant effect of the program, new entrants as well as existing firms adjusted to the program. Therefore, the change was less in 2015. Furthermore, the economic recession occurred in the economy in 2015. Since the implementation of the policy the economy was growing and so the private sector was able to accommodate the higher costs. However, with oil prices crashing in 2015, as well as the country going into conflict in Yemen, the government has stopped a majority of its public spending, shocking the economy with austerity measures leading to a recession. This could have diluted the effect of the *Nitaqat* policy.

Saudization

The *Saudization* rate refers to the number of Saudis in the private sector. Equation 4-2 now measures the effect of the policy on *Saudization* in both the Red and Yellow firms in relation to the Green band in Table 4.5. Here, the Red and Yellow firms are the treated groups and the Green firms are the control. The results in Table 4.5 show that the policy is highly significant for *Saudization* with a 99% level of confidence. Red firms appear to be more affected by the policy than the Yellow group, with *Saudization* increasing by 8.27% in 2012 with a steady increase in the policy in 2013 with 10.44% reaching 8.93% and 9.25% for 2014 and 2015 respectively. Hence, it is safe to say that in 2012, every 1% increase in *Saudization* for the Green firms there was an 8.27% increase for Red firms and 4.85% increase for Yellow firms. In 2015, a 1% increase in *Saudization* in Green firms is reflected in increases of 9.25% in Red firms and 6.22% in Yellow firms. *Saudization* has experienced a still and steady impact since the application of the program. The effect of the policy is positive and highly significant and maintained at a steady rate.

Foreigners' Percentage Change (t-1)

The fourth panel in Table 4.5 refers to equation 4-2 when Y_{ijst} measures the foreign percentage change. In 2012, the impact of the policy suggests that foreign employment declined by 15.34% for Red firms. Then the effect almost doubled in 2013 and 2014 reaching nearly -30%. However, the coefficient in 2015 drops to half at -14.29%. This shows that the policy was mostly effective on foreign employment changes during the first four years after the implementation. During the fifth year, the decline seems to increase significantly, which could mean that the economy was not able to maintain pace with the policy by laying off their foreign workers.

Looking at the Yellow firms, they exhibit a similar trend to that of the Red firms. However, 2013 shows a much larger impact with the decline in growth reaching 37.47% less foreign employment. The figures are high, however, similar to the Red firms, the decline in foreign employment decreases since then reaching 11.33% less foreign employment. This could indicate that the policy had a declining impact over time.

Exit Rates

The final panel in Table 4.5 refers to equation 4-2 when Y_{ijst} measures the exit rate. With (t-1) as a base year, the results show that between 2012 and 2013 the change in exit rate doubled for Red firms, from 10.10% to 21.30%, with a significance level of 99%, indicating that for every 1% increase in the exit rate in the Green band there is a 21.30% increase in the exit rate for Red firms in 2013. Moreover, the coefficient on the exit rate continued to rise reaching its peak at 29.09% in Red firms in 2014. During 2015 however, the effect of the exit rate declined slightly, so that for every 1% increase in exit rate in the Green band there was a 25.75% increase in the exit rate for Red firms. This could suggest that the private sector was finally adjusting to the *Nitaqat* policy even though the size of this effect can still be considered large. However the 3.34% decline in one year gives an optimistic outlook for the following years. The decline in 2015 also occurs for Yellow firms with a slightly lower decrease. Nonetheless, this is a positive sign that the private sector has begun to adjust to the policy.

Looking at the policy effect on Yellow firms, in general it seems to have a lower impact than for Red firms. 2012 is the exception, since the initial impact was higher than that for the Red firms. Yet, the increase in the coefficient is far less than that for Red firms, reaching its peak in 2013 with a 16.91% exit rate in firms with a positive yet declining impact in the following

years reaching its lowest in 2015 at 12.88%. The effect on Red firms appears larger than it was for Yellow firms. This is probably due to the stricter sanctions on the firms in the Red category which explains the higher exit rates.

Furthermore, when comparing the use of different base years in Table 4.3 and Table 4.5 on the change of exit rates, the results are higher in Red firms across years with a different trend. In the 2011 base year specification (Table 4.3) the growth in the exit rate peaks in 2013 at 17.24% which is far less than the peak in Table 4.5 in 2014 at 29.09%. Moreover, the trend seems to be decreasing from 2013 onwards in the 2011 model whereas the exit rate continues to increase with high growth until 2015 where it slightly decreases. As for Yellow firms, the rates are closer in both tables (4.3 and 4.5) and the trend is similar.

4.4.1 Robustness Check with Change in Treatment and Lags

As a final robustness check, we again used (t-1) as a base year for specification 4-3, where also included the third Green treatment group.

Table 4.6: Robustness check using base year (t-1), equation 4-3.

	2012	*2013*	*2014*	*2015*
Saudization				
D(Red)	8.16***	10.34***	8.89***	9.23***
	(0.54)	(0.61)	(0.41)	(0.525)
D(Yellow)	4.71***	4.87***	5.24***	6.17***
	(0.41)	(0.31)	(0.275)	(0.36)
D(Green>5)	-3.12***	-2.40**	-1.13**	-1.14***
	(0.77)	(0.69)	(0.36)	(0.25)
N	154616	85244	90955	133027
Saudi Percentage				
D(Red)	75.67**	11.12	-5.97*	-15.87***
	(0.25)	(0.07)	(0.03)	(0.04)
D(Yellow)	21.38*	35.56***	-10.89*	5.98
	(0.11)	(0.10)	(0.06)	(0.04)
D(Green>5)	-73.58***	-62.95***	-41.96**	-60.79*
	(0.15)	(0.16)	(0.13)	(0.27)

N	34205	44449	66483	108135
Saudi Employees				
D(Red)	0.80**	-0.18	-0.60*	-0.45***
	(0.253)	(0.199)	(0.26)	(0.12)
D(Yellow)	0.58**	0.23	-0.54	-0.22
	(0.194)	(0.464)	(0.34)	(0.17)
D(Green>5)	-8.34*	-0.05	2.01	-3.01*
	(3.44)	(2.62)	(1.42)	(1.66)
N	154616	85244	90955	133027
Foreign Percentage				
D(Red)	-15.50**	-29.81***	-30.22***	-15.03***
	(0.045)	(0.41)	(0.057)	(0.21)
D(Yellow)	-12.96**	-37.73**	-28.63***	-12.94**
	(0.041)	(0.18)	(0.067)	(0.042)
D(Green>5)	-3.88	-3.95	-10.68	-40.94
	(0.035)	(0.27)	(0.27)	(0.305)
N	126726	77898	82804	124233
Foreign Employees				
D(Red)	-4.12***	-12.00**	-13.62**	-5.43*
	(1.12)	(3.41)	(4.76)	(2.17)
D(Yellow)	-1.57	-12.39***	-7.52*	-3.198*
	(0.96)	(3.13)	(3.28)	(1.27)
D(Green>5)	-26.87*	51.15***	48.13***	4.96
	(12.63)	(16.48)	(13.40)	(7.27)
N	154616	85244	90955	133027
Total Employment Percentage				
D(Red)	-15.54***	-32.05***	-33.57***	-23.92***
	(0.034)	(0.054)	(0.064)	(0.044)
D(Yellow)	-10.42*	-37.83**	-33.14***	-10.91
	(0.041)	(0.121)	(0.083)	(0.10)
D(Green>5)	-24.30***	-83.49*	-75.41	-301.36
	(0.069)	(0.377)	(0.466)	(2.20)
N	128339	78772	83921	125827
Total Employees				
D(Red)	-3.33**	-12.18**	-14.25**	-5.87*
	(1.04)	(3.56)	(4.99)	(2.26)
D(Yellow)	-0.99	-12.16***	-8.067*	-3.42*
	(0.97)	(3.23)	(3.54)	(1.41)
D(Green>5)	18.54	51.11**	50.14**	1.95
	(11.27)	(17.67)	(14.20)	(8.76)
N	154616	85244	90955	133027
Exit Rate				
D(Red)	9.92***	21.41***	29.08***	25.76***
	(1.084)	(2.01)	(2.4)	(4.08)
D(Yellow)	14.49***	17.05***	15.08***	12.90***
	(1.48)	(2.48)	(1.72)	(1.19)
D(Green>5)	-6.62**	3.91*	-0.31	0.82
	(2.423)	(1.95)	(2.19)	(1.31)
N	257182	175910	186916	188646

Note: *p<0.1, **p<0.05, ***p<0.01. Standard Errors are reported in parenthesis
Data Source: Nitaqat Dataset, MOL

Overall, the results in Table 4.6. using specification 4-3 follow the same trend as results from specification 4.2 of (t-1) from Table 4.5. It is interesting to see that the coefficient on the percentage change of Saudi employees is also significant, suggesting a rise of 75% in the second panel of Table 4.6 and a rise of 80% in Saudi employment coefficients in Table 4.5 for the Red firms in 2012. The Yellow firms also increase coefficients by 21% in Table 4.6 and 29% in Table 4.5 in comparison to a 1% rise in Saudi employment coefficients of Green firms in 2012. However, in the following year, 2013, the growth in the Saudi employment coefficient drops considerably to around 11% and 14% in Tables 4.6 and 4.5 respectively. This downward trend continues to reach negative growth in 2014 and 2015 for both Red and Yellow firms. This confirms our previous results for Saudi employment. Additionally, the coefficients for the Green firms follow an opposite trend for all of the variables studied confirming the fact that these firms are receiving benefits and behaving in the opposite direction to the Red and Yellow firms.

Females

Furthermore, since the dataset includes some gender data, the following section attempts to include the effect of the policy on female employment. The specification attempts to analyse the results on female employment in Red and Yellow firms against the Green firms.

$$Females = \alpha + \gamma.D(Red)_i + \gamma.D(Yellow)_i + \epsilon_i \quad 4\text{-}4)$$

The following table will use DID using base year (2011), equation 4-4.

Table 4.7: Female Employment

Females	*2012*	*2013*	*2014*	*2015*
Red	-0.922***	-1.13***	-1.24***	-1.17***
	(0.13)	(0.21)	(0.24)	(0.29)
Yellow	0.496**	1.16***	1.33***	1.86***
	(0.19)	(0.29)	(0.35)	(0.42)
N	154,616	96,704	82,763	74,559

Note: *p<0.1, **p<0.05, ***p<0.01. Standard Errors are reported in parenthesis
Data Source: Nitaqat Dataset, MOL

Table 4.7 represents the impact of the *Nitaqat* program on female employment over time, based on the year of 2011. It appears that the policy had a significant effect, as it is significant at the 99% level. Moreover, Yellow firms had a positive impact on females, with each two-employee increase in the Green firms, around one employee increased in the Yellow firms in 2012. There continued a steady increase in the following years reaching around two female employees per Yellow firm in 2015. Meanwhile, the Red firms present a negative trend. It is expected that the policy is associated with negative female employment in firms in the Red band, as they are mostly small in size, and fall far behind the quota. Therefore, they cannot accommodate the higher costs associated with recruiting female workers, such as separate working sections for males and females. It is also apparent that the numbers of Red and Yellow firms are decreasing with each passing year. This shows the great impact of the policy, since a decreasing number might indicate that firms have exited the market or have complied with the policy and were qualified to move up to the Green category.

4.5 Analysis of Results in Relation to the Literature

Peck (2017) conducted the first analysis on the *Nitaqat* dataset that is used in this chapter. She studied the immediate shock of the program after its application. This thesis examines whether her results were just a one-time shock to the economy, or whether they had a consistent, lasting effect. We have studied the program from the start of its application in July 2011 until October 2015 and therefore this section of the thesis makes a unique contribution to the existing literature. We have also analysed the impact of the *Nitaqat* program on females in the labour market, which has never been studied in the existing published literature. The results of this chapter confirm the results of Peck (2017) for 2012. However, our further analysis over time has shown that the policy did not continue to a significant impact on Saudi employment. The effects on *Saudization*, foreign and total employment, as well as exit rates all continued to be significant over time. With *Saudization* and exit rate coefficients both demonstrating a steady trend, while foreign and total employment coefficients continued to have a significantly declining trend over time.

In terms of the effect of the policy, the Le Chatelier principle (Griffin,1992) is supported here. The principle suggests that imposing restrictions on the behaviour of an agent, in this case, the firms, has two main results: First, the agent cannot advance with these restrictions as supported by the higher exit rate of firms as a result of the *Nitaqat* policy. And, second, the aptitude to react to changes by the agent in its environment will be reduced. This is also seen in the remaining firms' behaviour, with the higher cost on firms, their behaviour is restricted by having less elastic labour demand, resulting in declining employment levels. Moreover, the findings of this chapter also support the findings of Leonard (1984) and Holzer and Neumar (1999) as these authors suggest that policies, such as affirmative actions, resulted in

rising employment levels of women and minorities and declining employment levels in the majority group. In the case of *Nitaqat*, the Saudi employment share in the private sector has increased from around 10% in 2011 to almost 20% by 2015. However, foreign employment, as well as total employment have both declined immensely overall. Both studies (Leonard, 1984; Holzer and Neumar, 1999) claim that the results are modest due to weak enforcement of affirmative action policy. However, with the strong enforcement of the *Nitaqat* policy, the effects are very severe on the private sector.

Smith and Welch (1984) argue that the effect of the affirmative action policy on employment was greater in the earlier periods although there was weaker enforcement of the policy in the previous period. This is also consistent with results from this thesis, which show the highest impact of the *Nitaqat* policy was in the first year of its application. The difference here between the two policies is that affirmative action was enforced weakly and therefore the results took longer to appear whereas the *Nitaqat* policy had strict sanctions such that the results were apparent almost right away.

Garicano, Lelarge and Van Reenen (2016) discuss the impact of increased labour costs on firms in France once they reach 50 workers in size. Such costs include creating a health and safety committee, appointing a union representative, reporting workers' information to the Ministry of Labour, etc. Hence, it was found that most firms around the threshold would choose to lie just below it to avoid the extra cost. This has resulted in having low employment in more productive firms due to their choice to stay below the threshold which makes the workers as the losers in this policy, as they must pay these extra costs themselves in these smaller firms. A similar effect was found in the Saudi labour market as *Nitaqat* required different thresholds for each colour, where each colour has its benefits and sanctions as firms

are faced with a percentage quota that they must achieve. Our results showed that firms chose to lay-off their foreign workers as a rapid response to the policy, hence reducing their sizes to achieve the smaller quota in the smaller size category and avoid sanctions.

As discussed in Chapter 3, labour demand theory is also relevant as it imposes costs on firms. The example of minimum wage effect literature is divided between the classical theory, proposing that minimum wage causes a decline in employment levels (Brown et al., 1982; Machin, 2002) and more recent studies (such as Card and Krueger, 1994; Neumark and Wascher, 2007; Lemos, 2009), which find no evidence of any impact of minimum wage on employment. Findings from this research are more supportive of the classical labour demand theory, suggesting a decline in employment levels. However, in the case of *Nitaqat*, the decrease in employment levels was significantly higher than those that were observed as a consequence of minimum wages.

4.6 Conclusion

In conclusion, the results in this chapter demonstrate that the *Nitaqat* program has met its primary goal by increasing *Saudization*. However, this has come at a significant cost to firms since it has increased exit rates and reduced total employment in the surviving firms. However, *Saudization* has improved and this is highly significant, ranging at around 10% growth in the proportion of Saudis in the employment population annually since the implementation of *Nitaqat*. *Saudization* has been the main goal of this policy; therefore, at face value, the greater *Saudization* is, the more successful the policy appears to be. Deeper investigation demonstrates that this is not straightforward. After analysing the growth of the number of Saudi employees per firm in the treated groups, the policy was only effective in

2012, which is the first year of implementation. The later years showed the policy to be effective in increasing Saudi employment. Given that the *Saudization* rate consists of Saudis and foreigners, an analysis of the foreign employee variable was undertaken. Since foreign employment makes up around 90% of the private sector labour force, it is sensible to assume that changes in the foreign employment variable would impact the composition of the labour market more so than that for Saudis. The results show that foreign employment was negatively affected by the policy and consequently the total employment was also negatively affected. These findings are contrary to the main aim of the policy, which was to raise Saudi employment whilst not incurring any costs on the private sector. Moreover, it appears that the impact of the *Nitaqat* policy still had a major effect on the Saudi economy five years after its implementation. The policy had a major impact up until 2014, but its affects started to decline from 2015 onwards. There were changes that occurred in the policy in 2016 and these include the option for firms to buy its quota from the MOL directly without having to hire more Saudis. Therefore, higher costs on firms will persist and this could continue to increase the exit rate through higher costs to firms. This could be considered as an employment tax on firms. However, other outcomes, such as the increase in Saudi employment and the decline of foreign employment, are likely to be affected by the policy over time.

Overall, the *Nitaqat* policy was successful in raising the employment of nationals in 2012, as well as decreasing the employment of foreign labour. However, one further question arises from this analysis to investigate to what extent these changes affected the quality and productivity of firms. Consequently, an analysis of the impact of the policy on productivity will be undertaken in Chapter 6.

Nitaqat increased the exit rate of firms in the private sector, raising another question as to whether this is a cost that needs to be paid to achieve sustainable economic development. It can also simply be an added cost that burdens the private sector and reduces its competitive advantage. According to the IMF (2012), in order to assure the continuation of labour demand, there needs to be high economic growth in the region. However, with the austerity measures that were implemented in 2015 and 2016, this became very difficult, since the economy had entered into a recession. This resulted in the private sector laying off large portions of its current workforce and downsizing to accommodate this. Consequently, there were further challenges to the *Nitaqat* policy. The MOL announced in 2016 that, for the private sector to achieve its required quota of employment, they could pay the amount to the MOL instead of resorting to masked employment. This defeated the main purpose of the program. Therefore, this study is unique, as it follows the effect of the policy since its implementation in 2011 up until the fourth quarter of 2015. With the austerity measures in 2016, the program changed its focus. Therefore, the quota requirement is now acting as a form of taxation on the private sector. It will be interesting to study the impact of higher taxes on firm sustainability and employment in future research.

In the long run, the government should invest in developing new employment opportunities for the increasing youth population in the country, rather than replacing foreign workers with local ones. The best path for the government to achieve economic growth and sustainability would be through investing in human capital through education and training programs.

4.A Appendix

Table 4.8. Firm movement between colours or exit across time, in actual numbers.

Starting colour			*Ending Colour*			
July 2011			**October 2012**			
	Red	Yellow	Green	Platinum	Exited	Total
White	-	-	-	-	-	-
Red	34,099	15,398	59,485	2,204	78,317	189,526
Yellow	1,651	2,868	13,438	334	14,401	32,693
Green	1,585	2,455	19,641	1,433	9,848	34,963
Platinum	53	69	884	1,294	699	2,999
Total	37,388	20,790	93,448	5,265	103,265	260,156
July 2012			**October 2013**			
White	-	-	-	-	-	-
Red	4,206	2,885	24,743	1,048	52,408	85,300
Yellow	1,136	1,327	10,505	294	16,123	29,390
Green	1,251	1,692	34,042	2,097	22,135	61,220
Platinum	50	102	2,290	1,632	895	4,969
Total	6,643	6,006	71,580	5,071	91,561	180,861
July 2013			**October 2014**			
White	545,217	1	881,987	-	156,516	1,583,753
Red	3,418	1,118	7,447	486	36,186	48,656
Yellow	781	1,173	9,111	319	15,082	26,466
Green	2,325	3,681	57,698	3,392	44,693	111,794
Platinum	300	171	3,820	2,281	4,113	10,685
Total	552,041	6,144	960,063	6,478	256,590	1,781,354
July 2014			**October 2015**			
White	265,592	-	1,095,908	-	108,731	1,470,267
Red	1,907	614	3,442	392	7,888	14,244
Yellow	165	745	8,053	272	6,469	15,706
Green	680	3,064	107,288	6,401	41,262	158,696
Platinum	25	102	5,365	443	2,944	8,879
Total	268,369	4,525	1,220,056	7,508	167,294	1,667,792

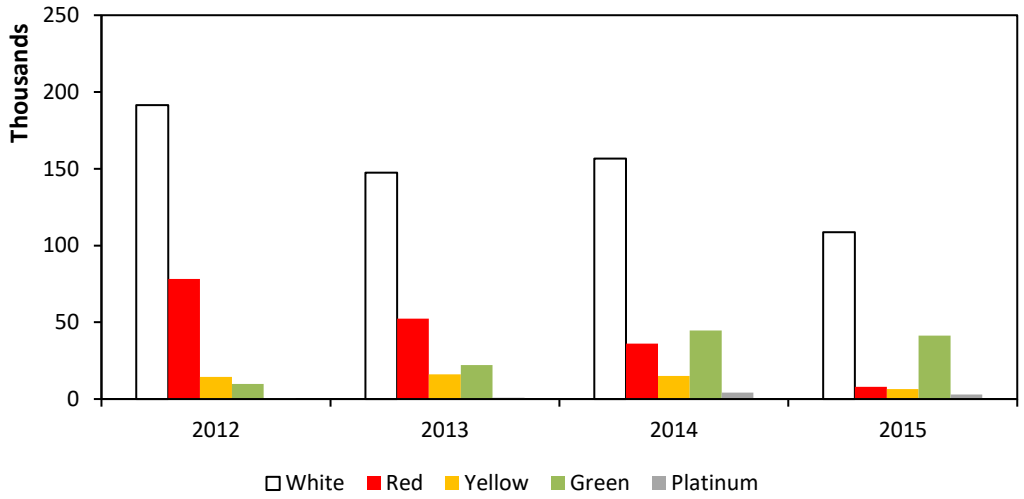


Figure 4.7: Number of firm exit by colour and year

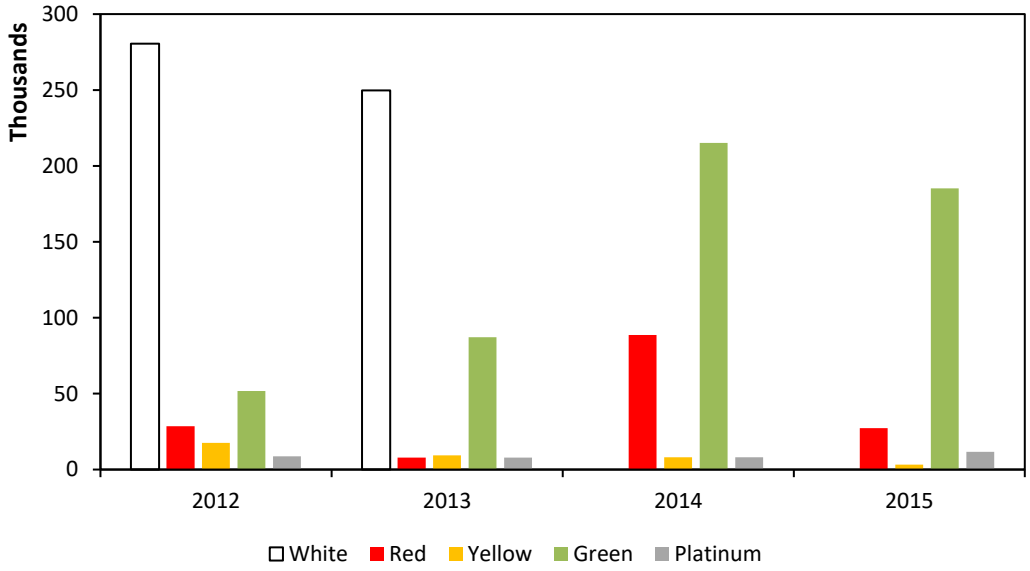


Figure 4.8: Number of firm entry by colour and year

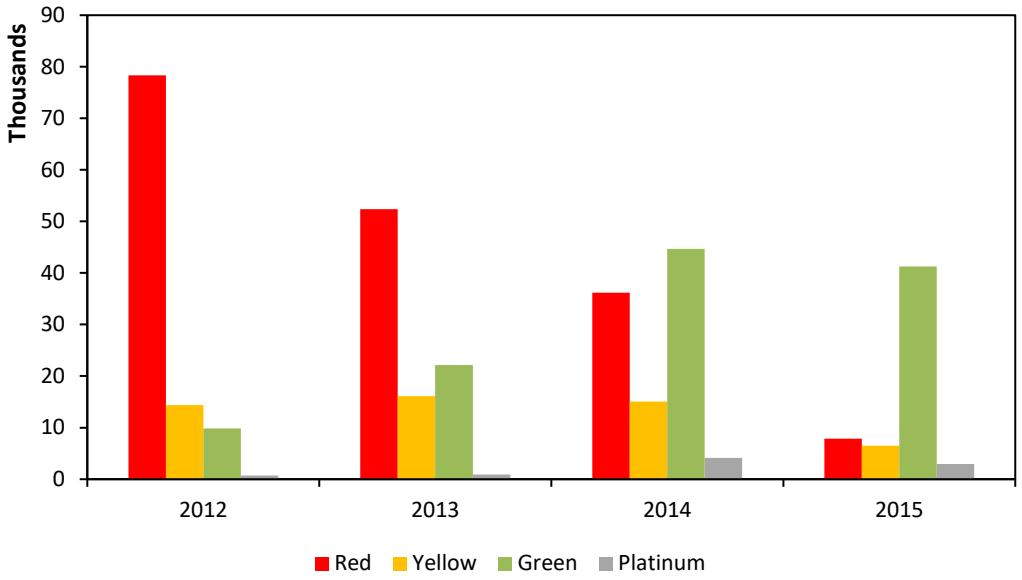


Figure 4.9: Number of firm exit by colour and year

Figures 4.7 and 4.9. describe the exit patterns using number of firms exited across time, it also distinguishes between colours. The first year, 2012, indicates the highest number of firm exits were by Red firms, followed by the Yellow firms, then Green. In 2013, the number of firms exiting is still highest for Red firms, however by a smaller number than in 2012. The Red firms have a declining trend over the time period analysed, therefore it is assumed that the number of Red firms is declining over time.

the figure gives an idea of the exit of firms in different colour bands across time. The highest exit rates overall are seen in 2012, however when looking at the exit rates for specific colours, the Red firms have their highest exit rates in 2012 and 2013, followed by the Yellow firms in 2012, and the Green firms in 2013. In 2014, Green firms showed higher exit rates with still having the Red firms following it. Meanwhile, in 2015, the Green exit rate is high above those of all other colours, which is probably because by this time many firms already adhere to the policy and due to the sub-categorisation of the Green band into low, medium,

and high bands. It is suggested that the exit rate is mostly at the low level as sanctions were starting to hit these firms.

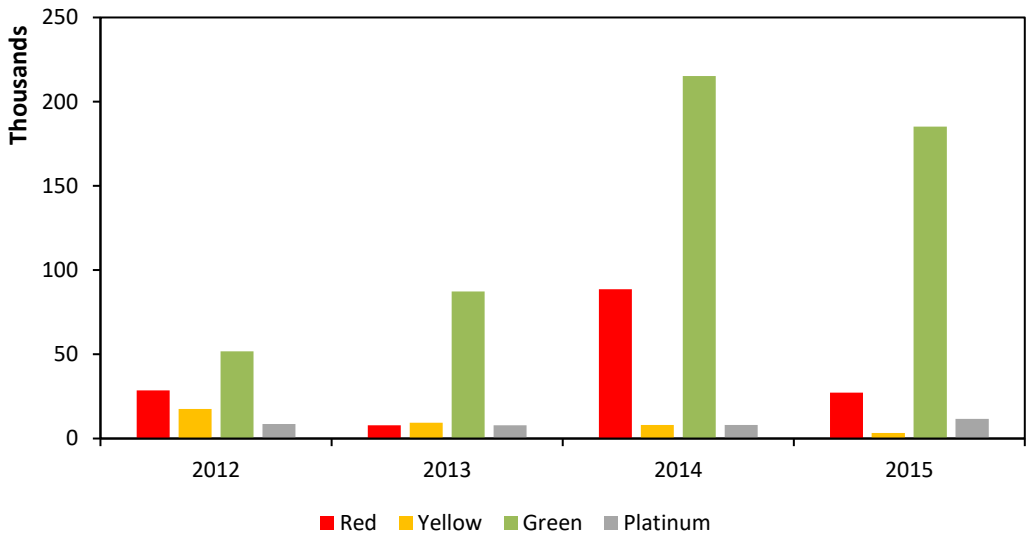


Figure 4.10: Number of firm entry by colour and year

Chapter 5 Earnings in the Saudi Labour Market

5.1 Introduction

This chapter provides an original analysis of Earnings in the Saudi private sector labour market. It will study the nature of the market before and after the *Nitaqat* policy implementation. It will use the GOSI dataset to analyse trends of nationality difference, gender, skills, and industry on hourly wage.

Within the framework of a dual labour market, the analysis in this chapter is divided between nationals and non-nationals. Section 5.2 describes the datasets used and some of the descriptive statistics, while Section 5.3 explains the methodology undertaken. Section 5.4 discusses the results and analysis, and Section 5.5 presents a summary and conclusions.

5.1.1 Growth in Labour Productivity

Table 5.1 presents the growth in labour productivity, defined as real GDP per hour worked, of the private sector with and without the oil industry.

Table 5.1: Growth in Labour Productivity

	(1)	*(2)*
Δln(Y/L)	*Private Sector including Oil industry*	*Private sector excluding Oil industry*
2007	0.24	9.44
2008	3.23	6.07
2009	-6.14	2.87
2010	-0.70	4.96
2011	-7.80	-9.63
2012	-0.55	-0.55
2013	2.49	7.31
2014	7.72	9.69
2015	3.91	2.78

Data Sources: SAMA, LFS

Table 5.1 shows the growth in real GDP per hour worked. The hours worked variable was

taken from the Labour Force Survey (LFS) and real GDP was taken from the Saudi Arabian Monetary Agency (SAMA) (SAMA, 2016). The LFS was missing in 2010 therefore we have interpolated the hours worked and divided the GDP for 2010 over the estimated hours worked. Column (1) reports labour productivity growth including the oil industry, while column (2) reports the growth excluding the oil industry. Labour productivity growth in the total private sector seems to have been affected by the global financial crisis, reporting a negative growth of -6.14% in 2009, before showing signs of recovery in 2010. However, in 2011 the growth drops reaching -7.8% after the implementation of *Nitaqat*, and remains negative in 2012. However, it appears to recover from 2013 to 2015. When we exclude the oil industry in column (2), the growth in labour productivity is positive from 2007 to 2010. There was a slight decline in the growth rate in 2009 but it was nevertheless still positive. In 2011, a significant negative decline of labour productivity growth reaches almost -10% in the private sector. Although it might be the impact of the *Nitaqat* implementation, at this point we cannot assume causality between *Nitaqat* and the decline. The results of Chapter 4 suggest that the implementation of *Nitaqat* seems to have had a bigger impact in the first two years, and with time, the private sector adjusted to the changes. Additionally, the labour demand theory suggests that with added costs on firms, productivity declines in the beginning, then it should increase with time so that firms can stay profitable and operate in the market. Section 5.4 will compare the differences between GDP per hour and *Wage per Hour*.

5.2 The Datasets[19]

This chapter utilises three datasets; SAMA, LFS, and GOSI. SAMA is the central bank of Saudi Arabia. Extracting data from Saudi Arabia is very difficult; the data is scattered across different governmental bodies, including the national accounts. SAMA produces an annual statistical dataset at the aggregate level merging data from different ministries, such as the MOL, The General Authority of Statistics and the Ministry of Oil, alongside its own financial data. The use of GDP earlier in Section 5.1 is taken from SAMA. The second dataset used in this chapter is the LFS, which is where we take the *Actual Hours Worked* data from, at the industry level.

The third and main dataset used in this chapter is the GOSI dataset which is a panel dataset at the individual level representing 10% of the population who are registered in the GOSI database. The dataset is very useful as every worker in the labour market is required to register with GOSI, therefore the dataset includes all employed individuals in the Saudi labour market. However, the sample dataset of GOSI that is used for this thesis covers only 10% of that population. Furthermore, the sample received follows individuals using an identification number from 2009 to 2015, with individuals studied across time without entry or exit rates. The individuals also stay within the same industries across the studied time period. There are 1,037,602 individuals in the sample of private sector employees. GOSI is the national pension scheme therefore it is one of the best available individual level datasets in Saudi Arabia. However, due to the difficulty of extracting data from such organisations,

[19] A summary table of datasets and variables used is found in the Appendix section 5.B

the data included only covers the years from 2009 until 2015. Ideally, we would have preferred to obtain earlier data to study a longer time trend however this request was denied.

The GOSI dataset includes many variables; *Age* (given by date of birth), *Nationality* (national or non-national), *Gender*, *Marital Status (married or unmarried), Industry* and *Subindustry*, *Education*, *Occupation*, *Region*, and *Wage*. The *Industry* variable is constituted by the 10 main industrial groups recognised at the macro level of the economy: Agriculture and fishing, commerce, community and social services, construction, utility represented by electricity, gas and water, finance, insurance and real estate, manufacturing, mining and quarrying, post and telecommunication and other activities. The *Subindustry* variable sub-categorises these main industries into fifty smaller ones. It would have been preferable to use fifty industries and make use of the detailed data provided, however due to the different datasets used in the study, the main industries were a better fit for consistency reasons. The *Age* variable was given by date of birth and therefore we were able to observe the annual age per individual across time.

The *Education* variable is divided into ten categories; *Illiterate, elementary, secondary, high school (tertiary), diploma, bachelors, masters, PhD, as well as Education verification in process, and N/A.* Education is widely used as a measure of human capital. However, GOSI has instructed that using education as a variable is unreliable due to the lack of enforcement in reporting the education level by individuals as well as the follow up if there were any development in educational attainment by the individual.

The *Occupation* variable consists of 2,026 different occupations; for simplicity reasons, the framework of Reijnders & de Vries (2007) was used to convert the occupations to skills; where we were able to aggregate the occupations from over 2,000 groups, into six. First is the

managerial group consisting of managers and legislators. Second is the professional group consisting of engineering, health, teaching and other professionals. Third, is the clerical group comprising of clerical support work. Fourth is production entailing craft workers and machine operators. Fifth is sales including sales workers and the last are services such as personal service workers. From this classification we were able to form the *Skill* variable with the first two groups of managerial and professionals forming the high skilled, third and fourth groups (clerical and production workers) forming the middle skilled workers, and the fifth and sixth groups (sales and services) categorised into the low skilled group[20].

Moving on to the *Wage* variable, this is given as average wage per month in Saudi Riyals, reported once a year. To be able to study the impact on productivity, *Wage* was divided by the number of weeks per month, to equalise the units as hours worked is taken on a weekly basis to develop the dependent variable of the model used in this chapter (*Wage per Hour*). However, the hours worked was not included in the dataset given by GOSI. It was found in the LFS, where it was also reported at the aggregated industry level.

One of the limitations faced in this chapter is the different industry classifications in different datasets and years. In Saudi Arabia, the data is produced by different governmental bodies; for example, the dataset used in Chapter 4 *"Nitaqat"* is produced by the MOL, whereas the wage dataset used in this chapter is produced by GOSI and the macro data is produced by the General Authority for Statistics. This resulted in major differences at the industry level. *Nitaqat* has 86 industries, whereas the GOSI data has around 50. The LFS and the national accounts have only nine basic industries. Meanwhile the Establishment Survey has changed

[20] The skill framework used by Reijnders & de Vries (2017) is listed in Appendix 5.A.

over time. From 2005 to 2009 it had 55 industries, however from 2010 to 2015 it further sub-categorises them into 82 industries. This has had an effect on the analysis; where we have tried to utilise the extra information in the more detailed datasets, while still using the basic nine industries in the macro productivity measures. There seems to be a trend to unify all data sources through the General Authority of Statistics; however it is not yet reflected on the datasets.

5.2.1 GOSI Dataset Descriptive Statistics

Table 5.2 reports the number of observations and their share in the GOSI dataset based on *Nationality* for Saudis and non-Saudis.

Table 5.2: GOSI Dataset Descriptive, Nationality

Nationality	*N*	*Share*
Saudis	230,523	22.22
Non-Saudis	807,080	77.78
Total	1,037,603	100.00

One of our interests in this chapter is to observe the differences between Saudis and non-Saudis, since the *Nitaqat* policy is targeting the ratio of *Saudization*. As shown above, the dataset comprises of 22% Saudis and 78% non-Saudis, which is not an accurate representation of the ratio of Saudis to foreigners in Saudi Arabia. However, GOSI data gives a better idea on *Wage per Hour* and change over time on the individual level that we do not see in other datasets used in this thesis.

Table 5.3 presents the *Education* variable in the dataset based on education category and *Nationality*.

Table 5.3: GOSI Dataset Descriptive Statistics: Education differences between Saudis and non-Saudis

	(1)	*(2)*	*(3)*	*(4)*
Education	*N (Saudis)*	*Share*	*N(Non-Saudis)*	*Share*
Higher Education	23,265	10.90	29,290	3.63
Middle Education	122,236	57.28	75,106	9.32
Lower Education	67,890	31.81	701,797	87.05
Total	213,391	100.00	806,193	100.00

Although GOSI has instructed that the education variable is unreliable due to the lack of enforcement in reporting the education level by individuals, it is interesting to report the available data and possibly observe some trends. The table indicates that around 11% of Saudis have higher education represented by an undergraduate degree or above, while only 3.63% of non-Saudis have higher education. The Saudis' majority education level is in the middle education which is between a high school degree to a two-year diploma post-high school, forming 57.28% of Saudis while the middle education of foreigners is still low, representing around 9% of the non-Saudi population. The lower education category represents education below secondary level, which is the majority of non-Saudis forming 87% of the non-Saudi workers, while Saudis have a lower rate at 32% of lower education holders. Although it was recommended not to use the education variable, based on this table, it is believed that the rates appear to give a reasonable representation of the labour market in Saudi Arabia, especially when compared to the skill level based on occupation divisions.

Table 5.4 reports the share of *Skill Level* based on *Nationality*, using the occupation cross classification as described above.

Table 5.4 GOSI Dataset Descriptive: Education differences between Saudis and non-Saudis

Skill Level	*(1)* *Saudis*	*(2)* *Share of Saudis*	*(3)* *Non-Saudis*	*(4)* *Share of Non-Saudis*
Higher Skilled	38,563	16.74	71,541	8.87
Medium Skilled	122,600	53.21	350,003	43.37
Lower Skilled	69,241	30.05	385,416	47.76
Total	230,404	100.00	806,960	100.00

Table 5.4 indicates that the majority of Saudis are in the medium skilled category (53%) whereas the highly skilled category contains almost 17% of Saudi workers and the lower skilled category 30%. Meanwhile, for non-Saudis, the majority (48%) are in the lower skilled category followed by the medium skilled category at 43%, with the highly skilled accounting for only 9% of foreign workers in Saudi Arabia. The percentages of each category of skill for both Saudis and non-Saudis are very similar to those of the education variable, except perhaps the division between middle and low for the non-Saudis. Given the issues with the education variable, we will use the skill variable in the analysis section later on.

Table 5.5 show the number of observations and their share based on the industry classification

Table 5.5: GOSI Dataset Descriptive: Employment in different industries (Saudis and non-Saudis)

Industry		*(1)*	*(2)*	*(3)*	*(4)*
		Saudis	*Share*	*Non-Saudis*	*Share*
1	*Agriculture & Fishing*	1,944	0.91	88,65	1.10
2	*Commerce*	51,665	24.21	189,074	23.45
3	*Community services and Other Social services*	27,948	13.10	47,091	5.84
4	*Construction*	61,116	28.64	386,170	47.90
5	*Electricity, Gas and Water (utility)*	4,120	1.93	6,211	0.77
6	*Finance, Insurance, Real estate and Business services*	23,351	10.94	60,870	7.55
7	*Manufacturing industries*	25,080	11.75	75,919	9.42
8	*Mining and Quarrying*	9,288	4.35	7,951	0.99
9	*Other Activities*	254	0.12	0	0.00
10	*Post and Telecommunications*	8,625	4.04	24,041	2.98
	Total	213,391	100.00	806,192	100.00

The highest shares for both nationalities are in the commerce and construction industries, forming 24% and around 29% for Saudis and 23% and 48% for non-Saudis respectively. These industries are followed by manufacturing industry at around 12% and 9% for Saudis and non-Saudis, respectively. The finance industry is the fourth largest, based on number of workers in the economy with 11% for Saudis and 7.5% for non-Saudis.

Table 5.6 shows mean wage per month based on *Gender* and *Nationality*.

Table 5.6: GOSI Dataset Descriptive: Mean wage per month between males, females, Saudis, and non-Saudis

		(1)	*(2)*
Year	*Gender*	*Saudi*	*Non-Saudi*
2009	Male	6186.734	1543.621
	Female	3700.3	2037.679
2010	Male	6215.276	1574.183
	Female	3744.172	2103.797
2011	Male	6012.727	1563.748
	Female	3714.013	2156.173
2012	Male	5959.21	1478.36
	Female	3521.602	2182.898
2013	Male	6273.463	1457.377
	Female	3824.898	2357.655
2014	Male	6565.727	1684.282
	Female	4041.338	2834.132
2015	Male	6773.635	1795.154
	Female	4073.158	3139.199
Mean	Male	6773.635	1795.154
	Female	4073.158	3139.199

Note: Currency is Saudi Riyal ($1USD = 3.75 SAR)

It is apparent that although the wage level is increasing on average, it seems to follow a normal inflation trend. However, in 2012, the wages of all categories had fallen. This might indicate how the firms reacted to the introduction of the *Nitaqat* program. Moreover, it is interesting to observe the difference in wages between males and females in both Saudis and non-Saudis. In line with the literature on the gender gap which suggests that women earn

lower wages around the world, it seems that women in Saudi Arabia earn around 60% of the wages of males. What is interesting is that non-national females earn higher wages than non-national males, where males earn between 60% to 70% of the foreign females' wages. This might be due to the structure of the dual labour economy, as many of the foreign workers are low skilled labour whereas females would tend to work in slightly more skilled environments, for example as nurses, air stewardesses or nannies. Although it is an interesting observation, the ratio of females to males is very low, between 1-2% of the male foreigners. Therefore, the differences in earnings are likely to indicate differences in skill or occupation rather than females earning higher wages.

5.3 Methodology

This section is a descriptive analysis of the Saudi economy before and after the *Nitaqat* policy, studying the impact of different variables on *Wage per Hour* over time using an earnings function. An earnings function is a function of individual wage rates regressed on a vector of personal, environmental, and market variables that influence the wage (Willis, 1986). Using the GOSI individual level data, Mincer (1947) wage equations were estimated by:

$$lnwage_{int} = \alpha_0 + \beta_1 X_{int} + \beta_2 S_{int} + \beta_3 I_{int} + \lambda \sum d_t + \mathcal{E}_{int} \qquad 5\text{-}1)$$

Where:

- X represents control variables such as *Age*, *Gender*, and *Marital Status*
- S represents the skill level, high and low skill studied against the medium skill category
- I represents Industry
- d_t is time dummy
- $\mathcal{E}$ is the error term

i is individual level = 1,2,…n

n Is Saudis and non-Saudis

t refers to time = 2009, 2010, … 2015.

The *Nitaqat* policy was introduced in mid-2011. Therefore, we aim to test *Wage per Hour* before and after the policy to see how it changes over time. Several variables were used as controls to the model such as *Age*, *Gender*, and *Marital Status*. Our focus is the effect of skills on *Wage per Hour* over time, as well as the impact on each industry.

The logarithmic form was used on both *Hourly Wage* and the *Age* variables. Contrary to the usual Mincer specification, the log of Age was used since all ages are increasing by one year each time due to the use of the administrative data of GOSI where the same individuals are observed over time without entry or exit. Therefore, it is better to take the log and estimate the impact as percentage changes over time. The rest of the variables are categorical, therefore dummy variables were used. The first two variables have only one dummy; where the *Gender* dummy is 1 for females and 0 otherwise and the *Marital Status* dummy is equal to 1 if married and 0 otherwise. The *Skill* variable has two dummies which are High and Low skilled, measured against the "*medium*" category. As for the *Industry*, the omitted category is Agriculture.

Basic economic theory suggests that "workers' real hourly compensation should grow in line with GDP per hour worked over the long run". This indicates that wage growth should be equal to productivity growth in the long run (Pessoa & Van Reenen, 2013). Therefore, we can loosely discuss the results in terms of productivity, assuming that labour productivity is equal to hourly wage. Moreover, due to the nature of the dual labour market, wages are different between both nationalities therefore this chapter studies nationalities separately.

The first specification uses a Fixed Effects (FE) panel, holding industries constant, to observe the trend of individual *hourly wage* before and after the implementation of *Nitaqat,* over a six-year period from *2009* to *2015*. Where the subscript 'n' will be used to refer to *Nationality*, represented by the following equation:

$$lnwage_{int} = \alpha_{int} + \beta_1 ln(age_{int}) + \beta_2 \sum d_t + \mathcal{E}_{int} \quad 5\text{-}2)$$

The specification will be conducted separately for each nationality, allowing for a better analysis by studying the impact of the *Age* and time dummies using an FE panel.

This is followed by the second specification, that uses a cross-sectional analysis over time. It allows for observation of change across time to observe the differences before and after the *Nitaqat* policy.

$$lnwage_{int} = \alpha_{int} + \beta_1 ln(age_{int}) + \beta_2 D(Gender_{int}) + \beta_3 D(Marital\ Status_{int}) + \beta_4 D(Skill_{int}) + \beta_5 D(Industry_{int}) + \mathcal{E}_{int} \quad 5\text{-}3)$$

Equation 5-3 will allow the study of the effect of the dummy variables such as *Gender*, *Skill*, and *Industry* on *Hourly Wage* over time. Although we cannot confirm a causal effect of the *Nitaqat* policy at this point on the change of trend, as Chapter 4 suggests, it did have major consequences on the private sector. Hence, it is interesting to study the trend of the *Wage per Hour* before and after the policy implementation.

The third specification will be used where the model will be applied on individual industries represented by the subscript 'j'.

$$lnwage_{injt} = \alpha_{int} + \beta_1 ln(age_{injt}) + \beta_2 D(Gender_{injt}) + \beta_3 D(Marital\ Status_{injt}) + \beta_4 D(Skill_{injt}) + \mathcal{E}_{injt} \quad 5\text{-}4)$$

It will focus on the most important industries and study the relationship of the control and skill variables on hourly wage over time within those industries; this was also conducted separately for Saudis and non-Saudis. The industries chosen are agriculture, commerce, construction, financial services, manufacturing, and the oil industry. Agriculture was chosen because it was the industry that was compared against in the earlier specifications therefore it was interesting to see how it operated before and after the policy. The commerce, construction, financial, and manufacturing industries represent the biggest industries in terms of number of workers, and the oil industry was also chosen because it is the biggest in terms of capital.

Moreover, many economists face the problem of endogeneity in such models. Endogeneity usually occurs when the independent variables "X" are determined by unobserved variables that also influence the dependent variable "Y" but can also occur due to unobserved measurement error in X or Y or both (Maluccio, 1998). With the use of administrative data, there was a limitation of finding good instrumental variables in the dataset, such as test scores, to address endogeneity issues. Endogeneity of education in the function of wage is often ignored in the literature of developing economies (Maluccio, 1998). Results with endogeneity could produce biased results. However, due to data limitations, we could not treat the endogeneity in the model.

5.4 Results

5.4.1 Panel

With the duality of the labour market, and the data availability of both Saudis and non-Saudis, Table 5.7 presents the first specification using an FE Panel (Equation 5.2) and was studied separately for each nationality, to allow for a good comparison between Saudis and non-Saudis in trends of hourly wage before and after the policy due to the duality of the labour market.

Table 5.7: FE Panel Regression on Saudis and Non-Saudis

	Nationality	
Ln (Hourly Wage)	*(1)*	*(2)*
	Saudi	*Non-Saudi*
Control Variables		
ln(Age)	0.0521***	0.0518*
	(0.039)	(0.020)
Year		
2010	-0.0094***	0.0215***
	(0.002)	(0.000)
2011	-0.0375***	0.0326***
	(0.003)	(0.001)
2012	-0.0358***	0.0363***
	(0.004)	(0.001)
2013	0.1354***	0.1011***
	(0.005)	(0.002)
2014	0.1489***	0.2070***
	(0.006)	(0.003)
2015	0.1559***	0.3030***
	(0.008)	(0.003)
N	162,305	1,218,980
R^2	0.5384	0.2175

Notes: * p < .1, ** p < .05, *** p < .01. Standard errors in parentheses.
Data Source: GOSI Dataset, GOSI

Table 5.7 reports growth in hourly wage from specification 5-2, using the log of *Age* variable

as a control, as explained above. The time dummies were used to observe the trend of hourly wage over time using an industry FE Panel at the individual level. Column (1) reports the results for Saudis, and column (2) for non-Saudis.

The *Age* shows high significance where a 1% increase in *Age* increases hourly wage by 0.05 percentage point for Saudis, although the effect is smaller for non-Saudis where hourly wage would rise by 0.05% with a 1% increase in *Age*. These results are expected to be positive, as the literature suggests that wage usually increases with *Age* and because *Age* is also correlated with experience and the more experience an individual has, the better their productivity is.

The time dummies are all compared against 2009 and there seems to be increasingly negative growth for Saudis between 2010 to 2012. From 2013, hourly wage for Saudis indicates significant positive results, reaching around 0.16% in 2015. Meanwhile, it is interesting to observe that the foreigners in column (2) have a positive trend from 2010 to 2015. However, the growth rate seemed constant in 2010 to 2012, and after 2013, the growth increased at a higher rate to reach 0.30% in 2015. The results suggest the productivity is rising for both nationalities from 2013 onwards, with foreigners indicating higher growth in productivity. Overall, this indicates that hourly wage did suffer during the implementation of *Nitaqat* in 2011, however it started to recover from 2013 onwards.

The theory suggests that growth in *Wage per Hour* and labour productivity growth will be equal in the long run. Table 5.1 reported GDP per hour worked, with negative growth in 2011 and 2012, recovering in 2013 to 2015. Similarly, the results from Table 5.7 suggest that the growth in the hourly wage, controlling for other influences, parallels the trend of the Saudi workers. In contrast, foreigners in column (2) show a positive trend overall with a slightly

lower rate in 2011 and 2012, then higher rates from 2013 to 2015. Therefore, this still follows the same broad trend as for labour productivity in Table 5.7. The findings also support labour demand theory, such as the example of the impact of minimum wage policy on productivity. A policy such as *Nitaqat*, which imposes higher costs on firms, would reduce productivity growth in the short run but should increase it in the long term. However, this does not suggest the *Nitaqat* was the cause for the decline as it cannot be confirmed with this analysis.

5.4.2 Cross-Sectional Analysis over Time

The FE panel in the results above imposed the constraint that the impact of dummy variables such as *Skill*, *Gender*, and *Industry* could not be observed. Therefore, we next show results year-on-year using equation 5-3 to study the trend across time, distinguishing between Saudis and non-Saudis as there are major differences in terms of wages between the two groups owing to the duality of the market indicated by the subscript '*n*' for nationality. The *Gender* dummy is 1 for females and 0 otherwise, *Marital Status* dummy refers to 1 if married and 0 otherwise. The *Skill* dummy is categorised into three groups with high, medium, and low categories. The omitted group is the medium-skilled. The *Industry* variable is measured against the agriculture and forestry industry. Table 5.8 shows these cross-sectional results over time for Saudis.

Table 5.8: Cross-sectional results over time for Saudis

Log (Wage per Hour)	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Control Variables							
Log (Age)	0.9702*** (0.011)	0.9245*** (0.012)	0.8450*** (0.012)	0.8051*** (0.013)	0.6598*** (0.016)	0.3359*** (0.017)	-0.0554** (0.019)
Gender	-0.4275*** (0.007)	-0.4286*** (0.007)	-0.4299*** (0.007)	-0.3113*** (0.008)	0.0218* (0.011)	0.0688*** (0.011)	0.2614*** (0.013)
Marital Status	0.2274*** (0.017)	0.2533*** (0.016)	0.1246*** (0.026)	-0.1009** (0.035)	-0.1101* (0.045)	-0.0337 (0.046)	0.2488** (0.050)
Skill							
High Skilled	0.0389** (0.012)	0.0515*** (0.002)	0.0654*** (0.012)	0.1164*** (0.013)	0.1645*** (0.015)	0.2302*** (0.016)	0.2891*** (0.017)
Low Skilled	0.0082 (0.008)	-0.0178* (0.008)	-0.0484*** (0.008)	-0.1109*** (0.009)	-0.2045*** (0.011)	-0.2106*** (0.011)	-0.2646*** (0.012)
Industry number							
2	-0.0897* (0.037)	-0.0205 (0.035)	-0.0833* (0.038)	-0.1859*** (0.042)	-0.0709 (0.048)	-0.1216* (0.052)	-0.1835** (0.058)
3	0.0291 (0.038)	0.1223** (0.036)	0.0192 (0.039)	-0.1014* (0.043)	-0.1487** (0.050)	-0.1800** (0.053)	-0.3108*** (0.059)
4	-0.2051*** (0.037)	-0.1001** (0.035)	-0.1297** (0.038)	-0.1769*** (0.042)	-0.1295** (0.048)	-0.1433** (0.052)	-0.1807** (0.057)
5	0.8545* (0.056)	0.9252*** (0.054)	0.8347*** (0.056)	0.6709*** (0.059)	0.7600*** (0.065)	0.9395*** (0.068)	1.0311*** (0.074)
6	0.0920* (0.039)	0.2037*** (0.037)	0.1717** (0.040)	0.0741* (0.044)	0.1886*** (0.050)	0.1858** (0.054)	0.2125*** (0.060)
7	0.0569 (0.038)	0.1512*** (0.036)	0.1073** (0.039)	0.0198 (0.043)	0.1194* (0.050)	0.0795 (0.053)	0.0118 (0.059)
8	0.9892*** (0.048)	1.0903*** (0.046)	0.9736*** (0.048)	0.8424*** (0.052)	0.8300*** (0.056)	0.9463*** (0.060)	0.9499*** (0.066)
9	0.4049*** (0.045)	0.4728*** (0.043)	0.3246*** (0.045)	0.2191** (0.049)	0.3201*** (0.054)	0.3161*** (0.058)	0.2872** (0.065)
N	84,611	84,611	84,611	84,611	84,611	84,611	84,611
R^2	0.1848	0.1729	0.1430	0.1073	0.0642	0.0528	0.0504

Notes: ∗ p < .1, ** p < .05, *** p < .01. Cluster-robust standard errors in parentheses.
Industry numbers: 1. Agriculture and Forestry, 2. Commerce, 3. Community services and Other Social services, 4. Construction, 5. Electricity, Gas and Water (utility), 6. Finance, Insurance, Real estate and Business services, 7. Manufacturing industries, 8. Mining and Quarrying, 9. Post and Telecommunications.
Data Source: GOSI Dataset, GOSI

Starting with the results for Saudis the control variables are all significant; the *Age* is highly and positively significant in 2009, but there is a declining trend over time reaching a negative relationship in 2015. As we are following the *Age* of the individual over time, the wage equation suggests that *Age* is positively correlated with *Wage per Hour*, however it reaches a peak as the worker grows older where the relationship starts to decline. This is in line with what is observed in the trend of *Age* in Saudis with *Wage per Hour*.

The *Gender* variable is noteworthy. It represents the relationship of females against males regarding hourly wage, where the relationship seems constant with high significance at around -0.43% between 2009 and 2011, then in 2012 it increases to -0.31% before turning positively significant from 2013 to reach 0.26% in 2015. We assume that this might be another effect of the *Nitaqat* policy as the demand on females instantly increased with the implementation of the policy. National accounts suggest around 30% of females in the workforce are unemployed - therefore it was a quick substitute for foreign labour. The *Marital Status* was included as another control for the equation.

The skill variable is categorised into three groups; high, medium, and low. The omitted group is the medium-skilled group. Results indicate that the highly skilled category have a significant positive trend across time, increasing from 0.07% higher hourly wage than the medium category in 2011, to 0.12% in 2012. It continues to rise, reaching almost 0.29% higher *Wage per Hour* than for medium skilled workers in 2015. This trend might suggest that there is an increasing demand for highly skilled Saudis. Meanwhile, there is a growing negative significant trend for the low skilled Saudis, which might indicate that the low skilled Saudis are still not able to compete with the low skilled foreign workers, even with the policy implementation. As seen in the descriptive statistics Table 5.6, the mean wage of foreigners is

around 1,500 Saudi Riyal per month whereas the minimum wage for the Saudi is 3,000 Saudi Riyal per month so therefore the low skilled Saudi is still twice the cost of a foreign worker.

Furthermore, all industries are measured against the agriculture industry in this specification and are all significant in some way to the hourly wage. From the overall trend, we see that the most positively significant industries in relation to *Wage per Hour* for Saudis are mining and quarrying, which also includes the oil industry, the utility industry, and the financial services industry. However, the commerce and construction industries seem to have a negative relationship over time in relation to the agriculture industry. This might be because these two industries have the highest number of foreigners that could suggest that they are profoundly affected by the policy where the growth of wages even for Saudis are declining. Furthermore, the manufacturing sector starts to show mostly no significance from 2011 onwards. This might suggest that with the implementation of the policy, the manufacturing industry may have decided to invest more in physical capital rather than workers to improve their productivity. Further analysis is required to confirm that however, as the results only suggest that Saudis' hourly wage is not significant in the manufacturing sector compared to the agriculture industry.

The following table also uses the specification 5-3, but this time '*n*' indicates non-Saudis.

Table 5.9: Cross-sectional results over time for non-Saudis

Log (Wage per Hour)	2009	2010	2011	2012	2013	2014	2015
Control Variables							
Log (Age)	0.7691***	0.6646***	0.5699***	0.5038***	0.3521***	0.0986***	-0.2533***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.005)	(0.005)
Gender	-0.1123***	-0.1006***	-0.1068***	-0.1141***	-0.0386**	0.0045	0.0823***
	(0.010)	(0.010)	(0.010)	(0.007)	(0.012)	(0.014)	(0.015)
Mstat	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
Skill							
High Skilled	0.1883***	0.2266***	0.2756***	0.3614***	0.3860***	0.4524***	0.4987***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.009)
Low Skilled	-0.0221	-0.0586***	-0.0866***	-0.1191	-0.0792***	-0.0346***	0.0310***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)
Industry Number							
2	-0.0770***	-0.0450*	-0.0124	-0.0565***	-0.0258*	-0.0986***	-0.0479**
	(0.011)	(0.011)	(0.010)	(0.010)	(0.012)	(0.013)	(0.014)
3	0.0399**	0.0584***	0.0969***	0.0773***	0.1349***	0.0476**	0.0813***
	(0.013)	(0.012)	(0.011)	(0.012)	(0.013)	(0.014)	(0.017)
4	-0.1367***	-0.0935***	-0.0366***	-0.0809***	-0.0992***	-0.1670***	-0.1454***
	(0.011)	(0.001)	(0.010)	(0.010)	(0.011)	(0.013)	(0.014)
5	0.2762***	0.3077***	0.3571***	0.3233***	0.4739***	0.4542***	0.4758***
	(0.024)	(0.022)	(0.022)	(0.023)	(0.025)	(0.027)	(0.029)
6	-0.0990***	-0.0250***	0.0724***	0.0702***	0.1953***	0.1942***	0.3339***
	(0.012)	(0.012)	(0.010)	(0.010)	(0.012)	(0.014)	(0.015)
7	0.0566**	0.0901***	0.1327***	0.0980***	0.1291***	0.0519***	0.0779***
	(0.012)	(0.011)	(0.010)	(0.011)	(0.012)	(0.014)	(0.015)
8	0.1644**	0.2405 ***	0.3120***	0.0423***	0.4873***	0.5492***	0.6403***
	(0.024)	(0.023)	(0.023)	(0.024)	(0.026)	(0.028)	(0.031)
9	-0.0517***	-0.0295***	-0.0196	-0.0265*	0.0825***	0.0465**	0.1239***
	(0.014)	(0.012)	(0.012)	(0.012)	(0.014)	(0.015)	(0.017)
N	447,301	447,301	447,301	447,301	447,301	447,301	447,301
R^2	0.1096	0.0914	0.0815	0.0813	0.0615	0.0469	0.0460

Notes: ∗ p < .1, ** p < .05, *** p < .01. Cluster-robust standard errors in parentheses.
Industry numbers: 1. Agriculture and Forestry, 2. Commerce, 3. Community services and Other Social services, 4. Construction, 5. Electricity, Gas and Water (utility), 6. Finance, Insurance, Real estate and Business services, 7. Manufacturing industries, 8. Mining and Quarrying, 9. Post and Telecommunications.
Data Source: GOSI Dataset, GOSI

With the nature of the duality of the labour market in Saudi Arabia, the secondary market consisting of non-Saudis is a completely different case and therefore it was essential to separate Saudis and non-Saudis and study the results of each separately. As in the previous model, Age and Gender, are used as control variables. Age is positively related to *Wage per Hour* indicating that as *Age* increases, *Wage per Hour* also increases which supports the literature as greater age is generally considered to represent more experience. However, we can see from 2011 onwards that there is a significant declining trend with *Age* reaching -0.25% in 2015. This might coincide with the layoff trend reaction of the private sector that we witnessed in the previous chapter, which might tell us that most of the foreign workers who were made redundant were in the older age category. Moreover, gender is significant and negatively related to *Wage per Hour*. However, in 2013 the negative trend starts to decline to reach positive figures for foreign females in 2015. *Marital Status* is omitted here due to the lack of data on foreign workers, as many low skilled foreign workers come to work in Saudi Arabia on a temporary basis and do not bring their families with them.

Looking at the impact of skills on *Wage per Hour*, the higher skilled foreign workers are highly positively significant, and there seems to be an increasing trend over time. It is even higher than the impact of high skilled Saudi workers on the hourly wage. This might be further evidence of the segmented labour market. The wage system in the Saudi economy depends on the worker's skill level as well as their nationality. The highly skilled foreign workers usually come from developed countries. Therefore, to attract them to come to the Saudi economy and benefit from their skills the equilibrium wage needs to be very high, sometimes up to three times the wage of a national. On the other hand, there is a vast supply of low skilled foreign workers. Therefore, their wage levels are very low at around one third that of the wage of a Saudi national. This is represented by the negative significance of low

skilled foreign labour to *Wage per Hour* in comparison to the middle-skilled foreign workers, reaching almost -0.12% in 2012. This also could be evidence that the laid-off foreign labour is mostly from the low skilled category. The negative trend starts to recover in 2013, reaching positive significance in 2015. This indicates the importance of low skilled foreign workers to the economy, while the low skilled Saudi workers still have a negative impact on *Wage per Hour* with -0.26% in 2015.

Furthermore, looking at the impact of industries on *Wage per Hour* of foreigners, the overall trend shows a better relationship of industries on *Wage per Hour* on foreigners than Saudis. The construction industry is one of the most affected by *Nitaqat* as it has the largest percentage of low skilled foreign workers which has also affected the *Wage per Hour* of Saudis as they faced major cost increases and fines as the policy kept changing and becoming tighter. They were most hit with the annual fee of 2,400 SAR per foreign worker which was issued in 2013 to raise the cost of the foreign worker closer to the Saudi worker and eliminate the competitive advantage of the low skilled foreign worker accepting lower pay. This caused large cost increases in the private sector. All industries seem to be more significant with the non-Saudis specification which might be the case because the number of observations for non-Saudis are considerably larger than Saudis. The manufacturing industry is barely significant for Saudis across time but it shows a strong positive significance for foreigners. The telecommunications industry is quite interesting as it has a high percentage of Saudis and their quota is quite high, and we can see that *Wage per Hour* did decline in 2012; however, it increased from negative figures to positive ones with increasing growth until 2015. The industry trends look interesting; therefore, we will continue the analysis on individual industries across time in the next section.

5.4.3 Cross-sectional Analysis over Time per Industry

To further understand the before and after analysis, and since different industries had different results it was imperative to study the impact on *Wage per Hour* in individual industries (Equation 5-4) and study the difference between nationals and non-nationals. Because the previous specifications were testing industries based on the agriculture industry, it was best to start the analysis with this and observe how the different variables within these industries impacted hourly wage. The *Marital Status* is omitted in all non-Saudi specifications due to the missing data. The section will start by analysing the trends within six industries; agriculture and forestry, commerce, construction, financial services, manufacturing, mining and quarrying.

Table 5.10: Cross-sectional analysis over time for the agriculture and forestry Industry

Log (Wage per Hour)	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Saudis							
Log (Age)	0.9434***	0.8004***	0.7569***	0.7104***	0.5153**	0.3197*	-0.4245*
	(0.103)	(0.100)	(0.113)	(0.131)	(0.155)	(0.170)	(0.197)
Gender	-0.6221***	-0.5220***	-0.4173***	-0.3353**	-0.0277	0.4077**	0.2366*
	(0.090)	(0.084)	(0.092)	(0.103)	(0.117)	(0.124)	(0.139)
Marital Status	0.1223	0.1147	-0.1414	0.0380	0.7944	-0.0734	-0.0757
	(0.506)	(0.472)	(0.516)	(0.577)	(0.656)	(0.696)	(0.779)
High Skilled	0.0902	0.3581**	0.2638*	0.3164*	0.4781**	0.7514***	0.8331***
	(0.117)	(0.109)	(0.119)	(0.133)	(0.152)	(0.161)	(0.180)
Low Skilled	-0.0647	0.0259	0.0409	-0.0327	-0.0665	0.0039	-0.1811
	(0.084)	(0.078)	(0.085)	(0.095)	(0.108)	(0.115)	(0.129)
N	751	751	751	751	751	751	751
Adjusted R^2	0.1365	0.1237	0.0772	0.0516	0.0291	0.0468	0.0367
Non-Saudis							
Log (Age)	0.8904***	0.7349***	0.5989***	0.5400***	0.3255***	0.0650	-0.1802**
	(0.037)	(0.036)	(0.034)	(0.037)	(0.042)	(0.049)	(0.056)
Gender	0.0120	0.1116	-0.0052	-0.0248	-0.1539	0.1201	-0.183
	(0.228)	(0.216)	(0.197)	(0.208)	(0.233)	(0.261)	(0.294)
Marital Status	*(omitted)*	*(omitted)*	*(omitted)*	*(omitted)*	*(omitted)*	*(omitted)*	*(omitted)*
High Skilled	0.3991***	0.4050***	0.3101***	0.4429***	0.4246***	0.5778***	0.5909***
	(0.053)	(0.050)	(0.045)	(0.048)	(0.054)	(0.060)	(0.068)
Low Skilled	0.1494***	0.1127***	0.0267	-0.0481*	-0.0333	0.0223	0.0136
	(0.023)	(0.022)	(0.020)	(0.021)	(0.023)	(0.026)	(0.029)
N	5,075	5,075	5,075	5,075	5,075	5,075	5,075
Adjusted R^2	0.1203	0.0921	0.0676	0.0605	0.0255	0.0181	0.0162

Notes: * p < .1, ** p < .05, *** p < .01. Standard errors in parentheses.
Data Source: GOSI Dataset, GOSI

The agriculture industry was chosen because it was the industry that was compared against in the earlier specifications therefore it was interesting to see how it operated before and after the policy. Although this is just a sample of the actual industry, we can notice the difference in number of observations between nationals and non-nationals, with nationals representing around 15% of the working population in this industry. Meanwhile, looking at the other variables, *Age* seems to be highly and positively significant for both nationals and non-nationals except for 2014, and although in 2013 it drops by 20% for both nationals for non-nationals and turns insignificant in 2014, it returns to being negatively significant in 2015. This might show that as *Age* reaches a certain limit the relationship turns negative. Meanwhile, the gender variable in the agriculture industry is more interesting. Saudi women in this industry are negatively and significantly correlated with *Wage per Hour*, with a decline in 2012 from -0.42% to -0.34%. 2013 shows no significance, however 2014 and 2015 are highly positively significant. This might be an indication of how females were substitutes for foreign workers. The delay in the positive relation could be that the immediate substitution was not feasible at first due to strict regulations on employment of women in the workplace such as separate physical places of work, however the MOL has eased these restrictions on female employment to increase their participation in the labour market. This seemed to be the most sensible solution. The non-Saudi model of gender shows no significance which is expected as the agriculture industry is mostly male-dominated, and there are few jobs if any for low skilled female foreign workers in that industry.

Looking at the impact of skills, the high skilled Saudis are positively and significantly related to *Wage per Hour* across time, with a higher growth rate between 2013 and 2015. The high skill maybe corresponds with the significance of females which might suggest that the high skilled Saudis were females. The low skilled Saudis seemed to a have negative non-

significant relationship to *Wage per Hour*. Meanwhile, high-skilled foreigners are significantly related to *Wage per Hour* across the time period. The low-skilled foreign workers show a positive significant relationship in 2009 and 2010. From 2011 forward, there seems to be insignificance of low-skilled workers on hourly wage. This might indicate that foreign low skilled workers were replaced by capital or firms just reduced in size and improved the productivity of remaining workers to counteract the extra costs. While potentially interesting, the small sample sizes for the agriculture industry means these results should be treated with caution.

The industries chosen are agriculture, construction, financial services, manufacturing, and the oil industry. Agriculture was chosen because it was the industry that used as a basis for comparison in the earlier specifications and therefore it was interesting to see how it operated before and after the policy. The commerce, construction, financial, and manufacturing industries represent the biggest industries in term of number of workers, meanwhile, the oil industry was chosen because it is the biggest in terms of capital.

The following table uses Equation 5.4 on the commerce industry.

Table 5.11: Cross-sectional analysis over time for the Commerce Industry

Log (Wage per Hour)	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Saudis							
Log (Age)	0.6289***	0.5549***	0.4872***	0.5485***	0.5091***	0.2578***	-0.0523
	(0.017)	(0.017)	(0.019)	(0.021)	(0.027)	(0.030)	(0.035)
Gender	-0.4122***	-0.3985***	-0.3940***	-0.2983***	0.1086***	0.1918***	0.4078***
	(0.014)	(0.013)	(0.014)	(0.015)	(0.019)	(0.020)	(0.0023)
Marital Status	0.1915***	0.2024***	0.0682	-0.1020*	-0.1951*	-0.0327	0.2172*
	(0.055)	(0.053)	(0.056)	(0.061)	(0.076)	(0.081)	(0.90)
High Skilled	0.0646***	0.0599**	0.0641**	0.0844***	0.1245***	0.1780***	0.2033***
	(0.018)	(0.018)	(0.019)	(0.020)	(0.025)	(0.027)	(0.030)
Low Skilled	0.0174	-0.0052	-0.0168	-0.0773***	-0.1875***	-0.1636***	-0.2110***
	(0.013)	(0.013)	(0.013)	(0.014)	(0.018)	(0.019)	(0.021)
N	20,354	20,354	20,354	20,354	20,354	20,354	20,354
Adjusted R^2	0.0926	0.0803	0.0621	0.0494	0.0308	0.0178	0.0243
Non-Saudis							
Log (Age)	0.7513***	0.6369***	0.5195***	0.4529***	0.2538***	0.0165*	-0.3261***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.009)	(0.011)
Gender	- 0.1494***	-0.1630***	-0.1965***	-0.1768***	-0.1066**	-0.0125	0.1254***
	(0.020)	(0.020)	(0.018)	(0.019)	(0.021)	(0.023)	(0.027)
Marital Status	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
High Skilled	0.2363***	0.2892***	0.3429***	0.4398***	0.4606***	0.5212***	0.5624***
	(0.010)	(0.010)	(0.009)	(0.009)	(0.010)	(0.011)	(0.013)
Low Skilled	-0.0236***	-0.0575***	-0.0743***	-0.0827***	-0.0523***	-0.0206*	0.0207**
	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)	(0.005)	(0.006)
N	108,596	108,596	108,596	108,596	108,596	108,596	108,596
Adjusted R^2	0.0982	0.0813	0.0696	0.0634	0.0318	0.0220	0.0254

Notes: * p < .1, ** p < .05, *** p < .01. Standard errors in parentheses.
Data Source: GOSI Dataset, GOSI

The commerce industry is one of the biggest industries in Saudi. Therefore, it is vital to include it in the studies of industries. Furthermore, it has been shown in Tables 5.9 and 5.10 that negative trends occurred when compared against the agriculture industry indicating that it has been more negatively affected. The high share and number of foreigners in this industry might be an indicator of the negative trends observed in comparison with the agriculture industry. The gender dummy for Saudi females reports high positive growth in hourly wage from a negatively significant 0.41% in 2009 to a positive significance of 0.41% after six years in 2015. Since the relationship between female Saudis and hourly wage only became

positive from 2013 onwards, this might be a result of the policy although cannot be confirmed. Meanwhile, the non-Saudi gender dummy was negative throughout the time trend, but turned positively significant in 2015.

The high-skilled Saudi variable is positively significant from 2009 to 2015. However, there is a high growth after 2013, which might suggest an increase in productivity level of the highly skilled workers to compensate the added costs the private sector has endured after the policy implementation. Moreover, although the Saudi high-skilled workers are positive, the foreign high-skilled workers show higher growth, which might indicate that the foreign high-skilled workers in the commerce industry are more productive than the equivalent Saudi ones. The low-skilled variable is interesting; the Saudi low-skilled workers reported a significant negative growth between 2013 and 2015, indicating that they were the category that is contributing to higher costs of the firm without improving their productivity. The low-skilled foreigners were also negatively significant throughout the time trend but become positively significant in 2015 suggesting that they are more productive than the low-skilled Saudis.

The next table uses equation 5-4 on the construction industry.

Table 5.12: Cross-sectional analysis over time for the Construction Industry

Log (Wage per Hour)	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Saudis							
Log (Age)	0.3970***	0.4233***	0.4573***	0.4923***	0.4000***	0.0655*	-0.2922***
	(0.012)	(0.014)	(0.016)	(0.018)	(0.024)	(0.026)	(0.030)
Gender	-0.2752***	-0.3209***	-0.3807***	-0.2431***	0.1001***	0.0880***	0.4000***
	(0.012)	(0.012)	(0.014)	(0.015)	(0.019)	(0.021)	(0.023)
Marital Status	0.1599**	0.1934***	0.0847	-0.1656**	-0.0293	0.0820	0.3076**
	(0.046)	(0.049)	(0.055)	(0.062)	(0.077)	(0.082)	(0.091)
High Skilled	0.0300*	0.0143	0.0585***	0.1108***	0.1544***	0.2051***	0.2735***
	(0.014)	(0.014)	(0.016)	(0.018)	(0.023)	(0.025)	(0.027)
Low Skilled	0.0564***	0.0173	0.0020	-0.0631***	-0.1301***	-0.1519***	-0.1342***
	(0.011)	(0.012)	(0.013)	(0.015)	(0.019)	(0.020)	(0.022)
N	24,426	24,426	24,426	24,426	24,426	24,426	24,426
Adjusted R^2	0.0563	0.0567	0.0546	0.0361	0.0193	0.0080	0.0222
Non-Saudis							
Log (Age)	0.6317***	0.5368***	0.4593***	0.4042***	0.2956***	0.0578***	-0.24377 ***
	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)	(0.012)	(0.007)
Gender	-0.1326***	-0.1056***	-0.0983***	-0.1083***	-0.0397*	-0.0238	0.0247
	(0.017)	(0.016)	(0.016)	(0.016)	(0.018)	(0.020)	(0.023)
Marital Status	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
High Skilled	0.0856***	0.1186***	0.1625***	0.2194***	0.2672***	0.3251***	0.3796***
	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.007)	(0.008)
Low Skilled	-0.0269***	-0.0610***	-0.0920***	-0.1296***	-0.0897***	-0.0439***	0.0280***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)
N	213,420	213,420	213,420	213,420	213,420	213,420	213,420
Adjusted R^2	0.0858	0.0669	0.0570	0.0538	0.0295	0.0133	0.0145

Notes: * p < .1, ** p < .05, *** p < .01. Standard errors in parentheses.
Data Source: GOSI Dataset, GOSI

As mentioned previously, the construction industry is one of the industries most affected by the *Nitaqat* policy, as it has the highest share of foreigners amongst all industries. Therefore it was imperative to analyse this in detail. Starting with the impact of the *Age* variable on *Wage per Hour*, as *Age* rises there is a significant positive relationship with *Wage per Hour* for both Saudis and foreigners. However as observed in earlier sections, there seems to be a decline in 2013, continuing to 2014 and turning negative in 2015. The *Gender* variable is interesting, as the construction industry also follows the results of the previous industries. The Saudi females have a significant positive relation to *Wage per Hour* which starts as negative from

2009 to 2012, only to turn positive in 2013 at 0.10% and continues to rise reaching 0.40% in 2015. The Saudi female trend is more of an indicator of how these Saudi women can be productive and how the policy was a positive impact for them regarding replacing foreign workers and being able to be hired in different industries rather than being constrained to either the education or health sectors. The foreign *Gender* dummy shows insignificance in 2014 and 2015.

Moving on to the *Skill* impact on *Wage per Hour*, for Saudis, highly skilled Saudis start to become significant in 2011, starting with 0.06% in 2012 and continue to increase to 0.27% in 2015. The foreign highly skilled workers were also positively and significantly related to *Wage per Hour*, there has been a steady increase across all years from 0.08% in 2009 to 0.38% in 2015. There is no change in the trend during 2011 or 2012.

Meanwhile, low skilled workers show a significant negative relation with *Wage per Hour* for both Saudis and foreigners. For Saudis, there was a positive relationship before 2012, which was then negative between 2013 to 2015. However, foreigners show a slightly different trend having a negative significance even prior to the policy implementation, with positive growth over the years to reach positive significance in 2015 at 0.02%. This might show the importance of the low skilled foreign worker in the construction industry, and how eventually they will need to be productive in order for the firm to remain profitable.

Table 5.13 reports the results of Equation 5-4 for the finance, insurance and business services industries.

Table 5.13: Cross-sectional analysis over time for the Finance, Insurance and Business Services Industries

Log (Wage/ Hour)	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Saudis							
Log (Age)	1.3141***	1.2877***	1.1749***	1.0797***	0.8525***	0.5574***	-0.0042
	(0.040)	(0.042)	(0.046)	(0.050)	(0.059)	(0.063)	(0.072)
Gender	-0.4863***	-0.4618***	-0.4645***	-0.3711***	-0.0105	0.1026*	0.2776***
	(0.032)	(0.032)	(0.033)	(0.034)	(0.040)	(0.042)	(0.046)
Marital Status	0.3601*	0.4144**	0.1736	0.2312	-0.0392	0.1553	-0.1232
	(0.156)	(0.157)	(0.163)	(0.171)	(0.195)	(0.206)	(0.224)
High Skilled	-0.1419***	-0.1030***	-0.0281	0.0588	0.1776***	0.2329***	0.3648***
	(0.036)	(0.036)	(0.037)	(0.039)	(0.044)	(0.047)	(0.051)
Low Skilled	-0.2097***	-0.2240***	-0.3004***	-0.4173***	-0.4564***	-0.4524***	-0.5434***
	(0.031)	(0.031)	(0.032)	(0.033)	(0.038)	(0.040)	(0.044)
N	9,247	9,247	9,247	9,247	9,247	9,247	9,247
Adjusted R^2	0.1233	0.1124	0.0928	0.0796	0.0469	0.0319	0.0316
Non-Saudis							
Log (Age)	0.8215***	0.7911***	0.7884***	0.7617***	0.6106***	0.2700***	-0.3469***
	(0.015)	(0.015)	(0.016)	(0.017)	(0.020)	(0.023)	(0.026)
Gender	-0.1202**	-0.1367**	-0.1698***	-0.1901***	-0.0493	0.0249	0.3176***
	(0.043)	(0.043)	(0.043)	(0.046)	(0.053)	(0.058)	(0.065)
Marital Status	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
High Skilled	0.2709***	0.2705***	0.3269***	0.4640***	0.5689***	0.6526***	0.7660***
	(0.016)	(0.016)	(0.016)	(0.017)	(0.019)	(0.021)	(0.023)
Low Skilled	-0.0727***	-0.1056***	-0.1247***	-0.1791***	-0.1319***	-0.0524***	0.0655***
	(0.010)	(0.011)	(0.010)	(0.011)	(0.013)	(0.014)	(0.015)
N	32,359	32,359	32,359	32,359	32,359	32,359	32,359
Adjusted R^2	0.1092	0.1013	0.1054	0.1108	0.0753	0.0444	0.0386

Notes: ∗ p < .1, ** p < .05, *** p < .01. Standard errors in parentheses.
Data Source: GOSI Dataset, GOSI

The financial and service industries have high Saudi employment. *Age* is highly positively significant across all years except for 2015 where it turns into negative insignificance. Meanwhile, the *Age* for non-Saudis remains highly significant but negative in 2015. Moreover, Saudi females are negatively significant from 2009 up until 2012, but this shifts to high positive significance in 2014 and 2015, following the trend of the other previous industries in these two years, also showing the positive influence of Saudi female employment on *Wage per Hour* in individual industries. It is interesting to point out here that

during February 2017, the first Saudi female "Sarah Alsuhaimi" became chief of the Saudi stock exchange (Tadawal). This was a major advancement for female employment in Saudi Arabia. Similarly, non-national females seem to have had a negative relationship from 2009 until 2014, which turns highly positive and significant in 2015.

The skill level is interesting here because the high skill is in high demand for this industry. However, it is apparent that foreign high skilled workers are positively and significantly related to increases in *Wage per Hour* from 2009 onwards, and this even undergoes a major jump in 2012 and continues to grow significantly on an annual basis. Meanwhile, Saudi high skilled workers had a significant negative relationship with *Wage per Hour* between 2009 and 2011. The relationship turns positive in 2012 yet is still not significant, and only in 2013 does it become a positive and highly significant relationship which continues rising. This could indicate how the *Nitaqat* policy played a positive role especially in the financial and business services industries; the *Saudization* quota reached 70% to 80% for firm compliance, therefore employing more highly skilled nationals could have been the reason for the significant positive cause of higher *Wage per Hour*. Conversely, the *Low Skilled* variable shows negative significance for both Saudis and non-Saudis on *Wage per Hour*. This might be because of the more advanced services this industry provides and requires more highly skilled workers as having lower-skilled workers only hinders growth, although it is worth noting that the *Low Skilled* variable for foreign workers did show positive significance in 2015. Again this might also indicate the importance of low skilled foreign workers even in industries that require higher skill level.

Table 5.14 below continues using Equation 5-4 on the manufacturing industry.

Table 5.14: Cross-sectional analysis over time for the Manufacturing Industry

Log (Wage/ Hour)	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Saudis							
Log (Age)	1.1170***	1.0606***	0.9369***	0.9019***	0.7616***	0.4936***	0.1804*
	(0.031)	(0.033)	(0.035)	(0.039)	(0.046)	(0.050)	(0.057)
Gender	-0.6252***	-0.6094***	-0.6396***	-0.4639***	-0.0639*	-0.0242	0.0859*
	(0.027)	(0.027)	(0.028)	(0.029)	(0.034)	(0.036)	(0.039)
Marital Status	0.3115*	0.3455**	0.2332*	-0.0964	0.1300	0.2548	0.2634
	(0.131)	(0.131)	(0.136)	(0.143)	(0.165)	(0.174)	(0.190)
High Skilled	0.1643***	0.1838***	0.2103***	0.3004***	0.3839***	0.4350***	0.5553***
	(0.034)	(0.033)	(0.035)	(0.037)	(0.046)	(0.045)	(0.049)
Low Skilled	0.1011***	0.0694**	0.0226	-0.0006	-0.0826**	-0.1404***	-0.1966***
	(0.024)	(0.024)	(0.024)	(0.026)	(0.030)	(0.032)	(0.035)
N	10,040	10,040	10,040	10,040	10,040	10,040	10,040
Adjusted R^2	0.1506	0.1334	0.1092	0.0796	0.0411	0.0267	0.0236
Non-Saudis							
Log (Age)	1.0614***	0.9308***	0.8005***	0.6833***	0.4813***	0.2403***	-0.1031***
	(0.014)	(0.014)	(0.014)	(0.015)	(0.016)	(0.018)	(0.020)
Gender	-0.3649***	-0.3508***	-0.3059**	-0.3059***	-0.0663*	-0.0162	0.0220
	(0.030)	(0.030)	(0.029)	(0.029)	(0.032)	(0.034)	(0.038)
Marital Status	*(omitted)*	*(omitted)*	*(omitted)*	*(omitted)*	*(omitted)*	*(omitted)*	*(omitted)*
High Skilled	0.3052***	0.3790***	0.4612***	0.5361***	0.6155***	0.7216***	0.7706***
	(0.019)	(0.019)	(0.018)	(0.018)	(0.020)	(0.021)	(0.024)
Low Skilled	0.0040	-0.0253**	-0.0573***	-0.0917***	-0.0348***	0.0102	0.0711***
	(0.009)	(0.009)	(0.009)	(0.008)	(0.009)	(0.010)	(0.011)
N	42,427	42,427	42,427	42,427	42,427	42,427	42,427
Adjusted R^2	0.1308	0.1082	0.0924	0.0769	0.0454	0.0310	0.0235

Notes: * p < .1, ** p < .05, *** p < .01. Standard errors in parentheses.
Data Source: GOSI Dataset, GOSI

The manufacturing industry is one of the industries with a higher share of foreigners. *Age* and *Gender* follow a similar trend to the other industries. Meanwhile, lower skilled foreigners show a positive relationship in 2015 as opposed to the previous years where they had a negative significance. Low skilled Saudi workers show the opposite trend which is interesting, having positive significance prior to 2011, becoming negatively significant in 2013. However, the high skilled workers among both Saudis and non-Saudis show a positive and significant trend across all years examined.

Table 5.15 also reports the results of Equation 5-4 for the mining and quarrying industry.

Table 5.15: Cross-sectional analysis over time for the Mining and Quarrying Industry

Log (Wage/ Hour)	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Saudis							
Log (Age)	3.6182***	3.4090***	3.0374***	2.5343***	1.8235***	1.3473***	0.7918***
	(0.064)	(0.069)	(0.073)	(0.081)	(0.086)	(0.094)	(0.103)
Gender	-0.9959***	-1.0467***	-0.9228***	-0.8345***	-0.4653**	-0.3634*	-0.3117*
	(0.138)	(0.143)	(0.147)	(0.156)	(0.161)	(0.171)	(0.181)
Mstat	1.1729	1.2314	1.3045	0.9243	0.3304	-0.1998	-0.1082
	(0.776)	(0.801)	(0.823)	(0.878)	(0.905)	(0.957)	(1.017)
High Skilled	-0.5725***	-0.3888***	-0.3369***	-0.1794*	0.0947	0.3377**	0.5674***
	(0.085)	(0.087)	(0.090)	(0.095)	(0.098)	(0.104)	(0.111)
Low Skilled	-0.3436***	-0.4716***	-0.5796***	-0.6269***	-0.6479***	-0.7344***	-0.8290***
	(0.062)	(0.063)	(0.065)	(0.070)	(0.072)	(0.076)	(0.081)
N	3,798	3,798	3,798	3,798	3,798	3,798	3,798
Adjusted R^2	0.4588	0.3965	0.3157	0.2118	0.1158	0.0721	0.0493
Non-Saudis							
Log (Age)	1.5481***	1.4135***	1.2471***	1.1269***	0.9539***	0.6516***	0.1593
	(0.068)	(0.071)	(0.072)	(0.78)	(0.084)	(0.094)	(0.105)
Gender	1.0667***	0.9236***	0.7688***	0.8835***	1.0269***	0.7101***	0.6805**
	(0.156)	(0.157)	(0.155)	(0.165)	(0.171)	(0.187)	(0.203)
Mstat	*(omitted)*	*(omitted)*	*(omitted)*	*(omitted)*	*(omitted)*	*(omitted)*	*(omitted)*
High Skilled	0.2552***	0.2790***	0.3235***	0.4331***	0.5867***	0.8718***	0.9924***
	(0.065)	(0.065)	(0.064)	(0.068)	(0.071)	(0.077)	(0.084)
Low Skilled	-0.1742**	-0.2734***	-0.3308***	-0.4616***	-0.3814***	-0.3581***	-0.2450***
	(0.045)	(0.045)	(0.045)	(0.047)	(0.049)	(0.053)	(0.058)
N	3,927	3,927	3,927	3,927	3,927	3,927	3,927
Adjusted R^2	0.1446	0.1246	0.1098	0.1062	0.0903	0.0767	0.0550

Notes: * p < .1, ** p < .05, *** p < .01. Standard errors in parentheses.
Data Source: GOSI Dataset, GOSI

This industry is the most critical industry in Saudi Arabia as the economy is highly dependent on oil. The coefficients are somewhat higher than other industries, however, the trend of *Age* is similar for both Saudis and non-Saudis. *Gender* is interesting as it continues to be negative across time for Saudis. On the other hand, there is a high positive significance between the *Gender* variable and *Wage per Hour* in the non-Saudi workers. This might be reflective of the foreign female employment, both high and low skilled, in the Saudi oil company as it was an American company up until the end of the 1970s. The company therefore had a history of employing females already, but although still high it was declining in 2015. This might indicate a trend for female foreign workers being replaced by female nationals.

The skill level is highly significant for both high and low skilled workers, as well as nationals and non-nationals. For nationals, *High Skilled* is negatively correlated to *Wage per Hour* from 2009 to 2012, and the coefficient becomes highly and significantly positive in 2014-15. However, the *Low Skilled* nationals continue to have a negatively significant relationship with *Wage per Hour* that is increasing over time from 2009 to 2015. As for non-nationals, foreign *High Skilled* workers show a highly positive significance with an increasing trend on *Wage per Hour*. The *Low Skilled* foreign workers are showing a negatively significant relationship across all years.

Summary of Trend in Individual Industries

Table 5.16 summarises the results found in the different industries, including the similarities and differences between Saudis, foreigners, in terms of Gender, High Skilled, and Low Skilled variables' impact on Hourly Wage. The main interpretation of these results is that females showed positive improvement after 2012, which could reflect the impact of Nitaqat policy on Saudi female earnings, whereas the foreigner females had more negative relationship across time. The distinctive industry here is the Mining and Quarrying that includes the oil sector in Saudi. The oil sector had been exempted from regulations against female employment. Hence, it follows an opposite trend where Saudi females have a negative relationship and foreign females have positive relationship to earning in comparison to the male earnings.

Table 5.16: Summary of Results in Individual Industries

Variables	*Results*	*Similar Industries*	*Results*	*Similar Industries*
	Saudis		**Foreigner**	
1.Gender: representing females against males	1. Negative coefficients from 2009-2011, an increase in 2012, turning positive from 2013-2015. 2. Negative coefficients with increasing trend turning positive in 2014 or 2015. 3. Continued negative trend of females.	1.Agriculture and Forestry, Commerce, and Construction 2.Finance and Insurance and Manufacturing 3.Mining and Quarrying Industry	1. Insignificant negative trend from 2009 to 2015. 2. Significant negative trend 2009 to 2013, turning positive in 2014, 2015. 3. Significant positive trend from 2009 to 2015	1.Agriculture and Forestry. 2.Commerce, Construction, Finance and Insurance, and Manufacturing. 3.Mining and Quarrying Industry
2.High Skilled: Representing the high skilled individuals against the medium skilled	1. Positive trend throughout, however significant only after 2011. 2. Positive and highly significant from 2009-2015. 3. Negative significance 2009-2012, turns to positive significance in 2014 and 2015.	1.Agriculture and Forestry, Construction, Finance and Insurance. 2.Commerce and Manufacturing 3.Mining and Quarrying.	1. Significant positive trend throughout from 2009 to 2015.	1.Agriculture and Forestry, Commerce, Construction, Finance and Insurance, Manufacturing, and Mining and Quarrying
3.Low Skilled: Representing the low skilled individuals against the medium skilled	1. Insignificant negative but Trend from 2009 to 2015. 2. Significant negative trend from 2009 to 2015	1.Agriculture and Forestry 2.Commerce, Construction, Finance and Insurance, Manufacturing, and Mining and Quarrying.	1. Significant negative trend from 2009 to 2014 and significantly positive in 2015. 2. Significant negative trend from 2009 to 2015. 3. No clear trend with positive relation 2009-2010, negative 2012,2013, then positive 20014, 2015.	1.Commerce, Construction, Finance and Insurance, Manufacturing. 2.Mining and Quarrying. 3.Agriculture and Forestry

When looking at the high skilled variable's impact on earning compared to the medium skilled category, we found that in most industries, the high skilled Saudis were only significantly positive after 2012. Meanwhile, high skilled foreign workers show a high significant positive relationship to earnings in all industries. This is mostly due to the wage structure in the Saudi labour market, where the pay system is based on the standard of living of their country of origin. For example a low skilled worker from Bangladesh is paid one third the wage of Saudis, and the Saudis are paid one third of the wage of a high skilled western worker.

The low skilled results show negative results across time for both Saudis and foreigners, however, the foreigners in most industries were able to turn the relationship positive in 2015. This could indicate how the Saudi low skilled cannot compete with the low skilled foreigner as their hourly wages are greatly less than that of the Saudi low skilled. This also shows how the private sector is deeply dependent on low skilled foreign workers.

5.5 Conclusion

Using the wage equation, four different specifications were studied in this chapter. First we conducted an FE panel regression separately for Saudis and non-Saudis. Second, a cross-sectional analysis over time was studied separately based on nationality, and thirdly, we conducted a cross-sectional analysis over time for six different industries also based on nationality. One of the limitations of this chapter was that it was descriptive. The data did not allow for merging the *Nitaqat* data therefore although there are changes in trends across most of the results around the time of the *Nitaqat* implementation, we cannot confidently confirm that it is caused by the policy. Another limitation was the classification of industries where we had to use the aggregated industry level.

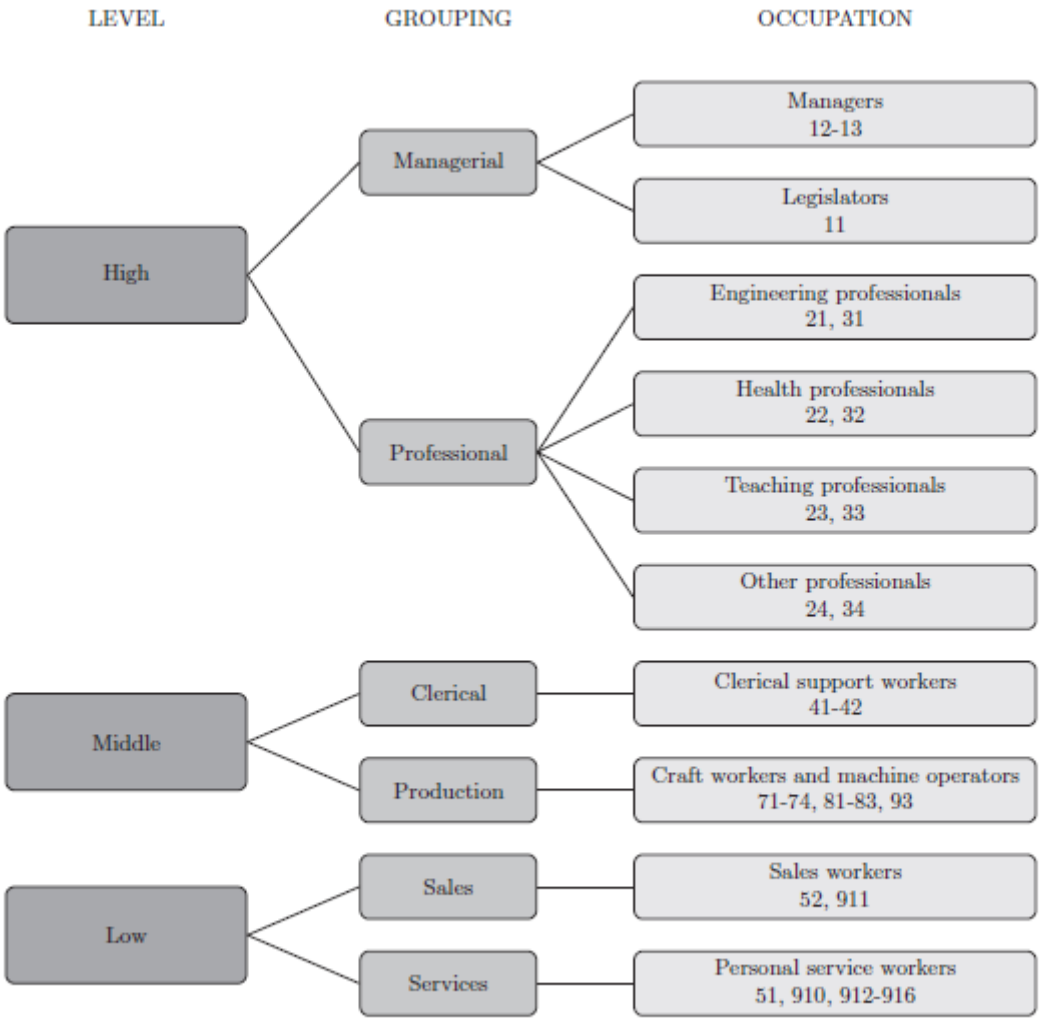
Although the input of *Nitaqat* policy variables was not included here due to limitations of the data, this chapter gave a picture of the impact of different variables before and after the policy on *Wage per Hour*. The literature suggests that *Wage per Hour* can be an indicator of productivity. The results suggested that growth in *Wage per Hour* does decline for Saudis during 2011 and 2012, while foreigners show a positive trend from 2010 to 2015, with lower growth between 2011 to 2012. This might suggest that with the introduction of the *Nitaqat* policy, there is an effect of lower growth and productivity during the initial few years of implementation. Following the theory of labour demand, the economy of the private sector seems to recover especially for the primary sector of the labour market which consists of Saudis. Meanwhile, the results on foreigners are somewhat conflicting, where the FE panel results in Table 5.7 showed that foreigners and Saudis had similar movements with higher growth rates for 2011-2013 and then significantly higher results in the last two years. The FE panel imposed the constraint that these variables cannot be observed over time. Tables 5.8 through to 5.15 observed the impact of variables such as *Age*, *Gender* and *Skill* on *Wage per Hour* year-on-year on the whole economy and on individual industries. The evidence showed how high skills are positively significant to the growth of the economy representing the need to invest in human capital. The *Low Skill* variable has shown negative trends for Saudis, whereas, low skilled foreigners' did suffer in between 2011 and 2013 before recovering in 2014 and 2015. Furthermore, there is an effect of higher *Wage per Hour* across time for females after 2011, which might be an impact of *Nitaqat*, although we cannot positively confirm causality at this point. It is impressive to see the change happening, as this period represents significant improvements that occurred in female employment during that time and the doors that were opened to increase their participation rate.

In terms of future analysis, it will be interesting to add the estimation of Oaxaca decomposition for Saudis and non-Saudis as well as females and males in future work. The Oaxaca decomposition is commonly used to examine the differences between the mean outcome of log wages. It divides these differentials into two parts; the explained and the unexplained. The explained part is the difference between the two groups; such as males and females that can be explained by difference in productivity characteristics (i.e. work experience or education). On the other hand, the unexplained is the residual that cannot be attributed to the common wage determinants, therefore is used as a measure for discrimination between the two groups (Jann, 2008).

The next chapter will bring in some of the impact of *Nitaqat* on productivity at the industry level.

5.6 Appendices

5.A Appendix



Notes: Agricultural workers and armed forces are omitted.

Figure 5.1: Framework of Reijnders & de Vries (2007)

5.B Appendix

Table 5.17: A summary table of datasets and variables used in Chapter 5.

Datasets	*Level of Data*	*Number of Observation*	*Variables Used*	*Variable Definition*
1. SAMA	Industry Level 1.Agriculture, forestry, fishery 2. Mining and quarrying 3. Transformative industries 4. Electricity, oil and water 5. Construction 6. Wholesale and retail, restaurants and hotels 7. Transport, storage and communications 8. Finance, insurance, real estate and business services 9. Public, social and personal services 10. Producers of government services	10 Industries	Real GDP	Is a macroeconomic measure of the value of economic output adjusted for price changes such as inflation or deflation.
2. LFS	Industry Level	10 Industries	Actual Average Hours Worked	The average hours worked per week at the industry level.
3. GOSI	Individual Level	1,037,602 Individuals	1. *Age* 2. *Nationality* 3. *Gender* 4. *Marital Status* 5. Industry 6. Sub-industry 7. Education	1. given by date of birth 2. National or non-National 3. Male or Female 4. Married or unmarried 5. The 10 industries mentioned in the SAMA panel, which allowed for the conversion between the three datasets at the industry level. 6. Consists of 50 smaller industries. 7. Ten categories; *Illiterate,*

			elementary, secondary, high school (tertiary), diploma, bachelors, masters, PhD, as well as Education verification in process, and N/A.
		8. *Occupation and Skill*	8. Over 2,000 groups of Occupations aggregated into three levels of skills (High, Medium, and Low).
		9. *Wage*	9. Given as wage per month in Saudi Riyals, reported once a year. We unified the units then divided wage over hours worked per industry from LFS to produce Hourly wage.

Chapter 6 Total Factor Productivity

6.1 Introduction

The previous chapter considered labour productivity. After adjusting for the use of physical capital 'K', this chapter links the impact of the *Nitaqat* policy on Total Factor Productivity (TFP) using both a growth accounting framework and regression analysis. The analysis of earnings in Chapter 5 suggests that a change happened in the economy right after the implementation of the *Nitaqat* policy, and this is likely to reflect a change in labour productivity. However, there was no definitive link to relate these results to *Nitaqat* because (as previously explained) it was not possible to merge the *Nitaqat* variables to the GOSI dataset. However, this chapter was able to merge the Annual Establishment Survey (AES) and the *Nitaqat* dataset at the industry level which has allowed for analysis of the effect of *Nitaqat* on productivity.

6.1.1 Growth Accounting Exercise

The growth accounting framework is the most commonly used measure internationally to measure productivity between countries. It is a specific and useful method that allows for observation of change in the economic structure over time (ONS Manual, 2007). It breaks down the economic growth into contributions of capital, labour and other inputs, however it does not imply a causal relationship (O'Mahony and Timmer, 2009; Jorgenson and Timmer, 2011; ONS Manual, 2007), The remaining residual factor is usually interpreted as the contribution of technology and is called the Solow residual, referencing the Solow growth

model, or more commonly TFP. Furthermore, growth accounting provides a good benchmark for economic performance analysis across countries (Bosworth and Collins, 2007).

The most basic form of the growth accounting calculation is given by:

$$\Delta lnA = \Delta\, ln\left(\frac{Y}{L}\right) - S\Delta ln(\frac{K}{L}) \quad 6\text{-}1)$$

$$S = 1 - \frac{Wage\ Bill}{GDP} \quad 6\text{-}2)$$

ΔlnA indicates the change in TFP, $\left(\frac{Y}{L}\right)$ is the real GDP for the private sector over the number of total workers in the private sector and S denotes the share of capital represented by equation 6-2. To calculate the capital stock variable, a deflation of the Investment variable (from Equation 6-1) was first necessary to obtain an accurate measure of real investment. However, with the lack of data available on the deflator for investments, the GDP deflator[21] was used as a substitute. The construction of Capital Stock assumes geometric depreciation (δ), as used in EU KLEMS (O'Mahony and Timmer, 2009), and is given by:

$$K_o = \frac{I_o}{\delta} \quad 6\text{-}3)$$

$$K_t = (K_{t-1})(1-\delta) + I_t \quad 6\text{-}4)$$

Where δ is the depreciation rate, K_t is Capital Stock, and I_t is Investment at time 't'. Following Bosworth & Collins (2008) and Espinoza (2012) we set the depreciation rate at 0.06.

[21] Calculated using the formula: $(Nominal\ GDP)_t/(Real\ GDP)_{2010}$

In Equation (6-1) L reflects the labour input, which was taken from the LFS. Although the LFS does not have a sectoral division between the public and private sector, the former is represented by the public administration industry, as well as education and health sectors which are mostly public. An exclusion of those three industries provides a measure of the number of workers and hours worked in the private sector. Labour input, L, was measured in two ways, first by using total hours worked per year in the private sector and secondly by using total number of workers in the private sector taken from the LFS data. The share of capital, S, was assumed to be 0.33 which is the world average (Senhadji, 2000, Weil, 2009, Schreyer, 2001) given the lack of reliable data for Saudi Arabia on this variable. However, because the share of the oil sector is very high, we also conducted the growth accounting using S=0.5, which gave similar trends[22]. The main growth accounting results are given in Table 6.1.

Table 6.1: Decomposition of GDP Per Hour worked (S=0.33)

	(1)	*(2)*	*(3)*	*(4)*
Year	$\Delta ln(Y/L)$	$\Delta ln(K/L)$	$S\Delta ln(K/L)$	$\Delta ln(A)$
2007	0.24	9.60	3.17	-2.93
2008	3.23	16.35	5.39	-2.16
2009	-6.14	-17.27	-5.70	-0.44
2010	-0.70	13.38	4.42	-5.12
2011	-7.80	0.08	0.03	-7.83
2012	-0.55	1.62	0.53	-1.08
2013	2.49	2.34	0.77	1.72
2014	7.72	5.18	1.71	6.01
2015	3.91	-15.47	-5.10	9.02

Table 6.1 presents the results of the growth accounting exercise from 2007 to 2015. As

[22] Results of S=0.5 are found in the appendices.

discussed in Chapter 3, it is useful to use total hours worked as it captures the fluctuations that might appear within firms in response to economic changes (ONS, 2007), in this context, the *Nitaqat* policy. It would be preferable to study a longer period but data prior to this date is missing. Column (1) represents the growth in labour productivity calculated through the growth of real GDP over total hours worked in the private sector. Although this exercise does not infer causality it is very likely that the decline in 2009 was due to the financial crisis. However, the negative growth continues to 2012, which is probably a reaction to *Nitaqat* by the private sector as it had to endure sudden higher costs when the policy was introduced in 2011. Labour productivity recovers to positive growth in 2013 to 2015.

These results confirm the analysis made in Chapter 5 studying the growth in labour productivity before and after the *Nitaqat* policy. Column (2) shows the growth in capital stock over total hours worked in the private sector. It is positive throughout the time period except for 2009 and 2015. The negative growth in 2009 is most likely due to the financial crisis impact. However, there is also a decline in the growth of capital stock per hour worked in 2011 by 13.30%, which might be the direct impact of the *Nitaqat* policy. The growth recovers in 2012 up until 2015 which was the beginning of the drop of oil prices around the world. As explained, the Saudi economy relies heavily on the oil revenue, and an increase or decrease in oil prices reflects immediately on the rest of the economy. Column (3) represents the growth in the share weighted capital-labour ratio, where S=0.33. Column (4) is the residual TFP. TFP shows a negative trend from 2007 to 2012, because it is calculated by subtracting column (1) from column (3) - the growth of the share of capital stock is higher than the growth in labour productivity which results in the negative trend in those years. The growth of labour productivity in column (1) started a positive trend in 2013 and increased by over 5% in 2014, which is also reflected in a positive growth in TFP in column (4).

Table 6.2 shows the growth accounting results when workers are used as the measure of labour input.

Table 6.2: Decomposition of GDP Per Worker S=0.33

	(1)	*(2)*	*(3)*	*(4)*
Year	$\Delta ln(Y/L)$	$\Delta ln(K/L)$	$S\Delta ln(K/L)$	$\Delta ln(A)$
2007	-2.45	6.91	2.28	-4.73
2008	1.70	14.81	4.89	-3.19
2009	-5.39	-16.53	-5.45	0.06
2010	-2.64	11.44	3.78	-6.42
2011	-5.68	2.20	0.73	-6.41
2012	-0.08	2.09	0.69	-0.77
2013	1.60	1.45	0.48	1.12
2014	0.75	-1.78	-0.59	1.34
2015	-0.76	-20.14	-6.65	5.88

The rest of this chapter uses number of workers, due to lack of data on hours worked in the AES on which the rest of the chapter relies, as well as the merging between the AES and the *Nitaqat* dataset. Therefore, Table 6.2 uses the labour input as number of workers in the private sector to have consistency of the labour inputs across different methods. The results have similar trends to the data shown in Table 6.1, except that the decline in labour productivity here in 2015 in column (1) is slightly more than it is using the per hour worked measure, where the growth in labour productivity reaches a negative rate. Moreover, the contribution of capital stock per worker also has a similar trend to the previous table. However, the negative growth starts to appear in 2014 whereas in Table 6.1, the contribution of the growth of capital stock only turns negative in 2015. The negative trend in the contribution of capital per worker indicates that firms in the private sector were forced to increase their labour productivity whilst reducing their capital per worker, which might suggest that this is their way to survive the higher costs imposed by *Nitaqat*, but it might also

be due to the oil price shock. Furthermore, column (4) representing the growth in TFP has the same trend as the previous table with a negative growth in 2011 and 2012, and a positive increasing trend between 2013 to 2015. These results indicate that productivity increased after the implementation of *Nitaqat,* however we cannot confirm the association of *Nitaqat* at this point and further analysis is necessary in order to do so.

Welch (1976) suggests that affirmative action policies result in productivity losses as workers are hired because of the quota requirement rather than their qualification, which is what is observed in the first two years of the application of *Nitaqat* in 2011 and 2012. However, he further suggests that policies such as the affirmative action would continue to reduce economic productivity and efficiency overall. However, the growth accounting results suggest otherwise. The fall in productivity right after the application of the policy, followed by an increased productivity is more in line with the theory of labour demand. As discussed in Chapter 3, Riley & Bondibene (2015) suggest that firms raise their productivity through increasing their TFP. The labour demand theory suggests that an introduction or a rise in the minimum wage causes higher costs on firms, therefore the immediate reaction would be a decline in productivity. Subsequently, to maintain profitability and continue operating in the market, firms must raise their labour productivity to match the higher costs and stay profitable. These results show that the private sector was able to increase its labour productivity between 2013 and 2015 per hour worked with a slight decline in 2015 per worker. TFP growth increases from 2013 to 2015 regardless of the labour measure.

6.2 The Dataset

This chapter uses two datasets. The first is the AES produced by the Saudi General Authority

for Statistics. The survey is executed annually exploring characteristics of economic establishments from around the Kingdom. It is based on a random sample of 33,000 establishments across all industries and covers all 13 major regions of Saudi Arabia; cities in these regions include around 84% of all establishments around the country as well as 91% of workers (https://www.stats.gov.sa/en/64).

Furthermore, it is an industry level dataset, providing data from 2005-2015; 2005-2009 includes 55 industries, and from 2010 onwards, industries were classified in more detail producing 83 industries. According to the methodology conducted for the survey, the classification of industries is based on the International Standard of Industrial Classification (ISIC REV.4), yet there are still minor changes that are adopted to fit the nature of establishments that operate in the Kingdom of Saudi Arabia (https://www.stats.gov.sa/en/64). Variables in the dataset are all classified by size and industry level[23]. Size class is based on number of employees and is divided into three classes; fewer than five employees, between five and nineteen employees, and twenty employees or more. This classification is different than the *Nitaqat* dataset where, as mentioned in the data section of Chapter 4, the sizes are divided into five categories. A matching between the different industries was made to enable the analysis of trends over time and therefore the industries from 2010 onwards were matched with the 2005 to 2009 producing 55 industries to provide consistency across time.

The variables in the dataset are: *Establishments,* defined as a legal economic entity that has a fixed location, operating in a specific industry (https://www.stats.gov.sa/en/64); Number of *Workers,* representing all individuals who work in the establishment, identified by their

[23] Table 6.13 shows the list of 26 industries merged from different datasets in the Appendix.

nationality, either Saudi or foreigner; *Worker Remuneration*, defined as the annual payment to workers per year, industry and size and also consisting of benefits and bonuses paid to workers; *Operating Expenses, covering* all establishments' expenses to operate within a specific industry, and perhaps the most important variable, *Operating Revenues,* defined as *"All cash revenues earned as a result of providing a service for consumers, trading in goods in general, or practicing a main activity or other secondary activities, such as the sale and marketing of its products. The operating revenues also include the sales of goods purchased for the purpose of reselling them in in the same condition, daily returns received in return for operations, total revenues of sales of manufactured products, other operating revenues that are not related to the main economic activity of the establishment but other secondary activities, such as revenues of industrial services and secondary activities, as well as revenues of selling manufacturing wastes and renting buildings, non-agricultural plots and machinery"* (https://www.stats.gov.sa/en/64). *Operating Revenues* is used as the output variable in the productivity function in this chapter. Lastly, we also use *Gross Capital Formation* made by the establishment each year. This will represent the basis for the capital stock calculation in the methodology section. The availability of this data has allowed the study of the economy before and after the *Nitaqat* policy in terms of productivity using various econometric techniques.

However, although the previously mentioned dataset is useful, to more accurately study the impact of the *Nitaqat* policy on productivity, we had to construct a new dataset, merging the *Nitaqat* dataset with the AES. This newly merged dataset includes only 26 industries[24], due to difficulties matching industry definition, and five years of data between 2011 and 2015. The

[24] Industry classification in the three datasets used are in the Appendix.

variables included in the merged dataset are; *SLED, ILED, KLED, LE, NFE, Lr, Ly, SaudiR, SaudiY, ForeignR, ForeignY*. The first five variables are taken from the AES, and the remaining are from the *Nitaqat* dataset. *SLED* is the deflated sales per worker; *ILED* is the investment per worker; *KLED* is the capital stock per worker; *LE* is total number of workers; and *NFE* is total number of firms. As for the *Nitaqat* dataset variables, we were able to extract *Lr*, which is the number of workers that are in Red firms. Similarly *Ly* is the number of workers in Yellow firms. The remaining variables have more detail on nationality - *SaudiR* and *ForeignR* are number of Saudi and foreign workers in Red firms, whereas *SaudiY* and *ForeignY* are number of Saudi and foreign workers in Yellow firms.

6.2.1 Summary Statistics

To understand sources of growth of TFP, it is good to measure the sources of growth represented by the labour and capital that make up the TFP. First, we calculate the average, growth in Sales per worker across all firms:

Table 6.3: Mean and Standard Deviation of growth in Sales and Capital per Worker

	Growth in Sales per Worker		*Growth in Capital Stock Per Worker*	
	(1)	*(2)*	*(3)*	*(4)*
Year	*Mean*	*SD*	*Mean*	*SD*
2012	0.44	2.25	6.95	12.31
2013	6.06	11.08	1.48	11.06
2014	-6.41	2.75	-1.43	30.78
2015	2.25	9.03	-3.42	9.61

Table 6.3 represents the average growth in sales per worker after the introduction of the policy, as seen in Chapter 5, growth in labour productivity starts to recover in 2015. The growth in capital stock is per worker and indicates a declining trend, suggesting that due to

the higher costs of the policy on the private sector, industries were forced to increase labour productivity while reducing their capital per worker to survive the higher costs imposed after the policy. These results are somewhat consistent with the growth accounting exercise conducted earlier in this chapter, with slight differences between the two results attributed to the variance in the different datasets used to conduct both methods. Columns (2) and (4) report the standard deviation from the mean across the sample of the 26 industries.

6.3 Methodology

This chapter uses a production function framework to measure TFP;

$$\left(\frac{Y_j}{L_j}\right) = f_j(\frac{K_j}{L_j}, T) \qquad 6\text{-}5)$$

Starting with the variables from AES dataset, Y_j denotes the output variable 'Sales' per industry and K_j indicates the capital stock variable per industry. We divide both by L_j, total number of workers, since we are interested in labour productivity.

As mentioned earlier, construction of the capital stock variable was necessary again as now the variables are from the AES dataset rather than national accounts in the growth accounting exercise. Deflating the Investment variable was necessary to obtain an accurate measure of real capital stock – this again used the GDP deflator due to lack of data on investment deflators. Similarly, to the calculation above we use geometric depreciation, with the depreciation rate equal to 0.06.

Using the production function as the basic framework, the econometric analysis is divided

into two parts; firstly the 'before and after' *Nitaqat* policy analysis in terms of labour productivity. The available data for this part is from 2005-2015. The analysis starts with the *before* period 2005-2010, and the *after* period is 2011-2015. This part will use FE panel regression analysis from the AES dataset at the industry level using 55 industries. The second part uses the new merged dataset of 26 industries, where the *Nitaqat* variables were included.

6.3.1 Before-After Analysis

First, a "Before-After" panel data analysis was conducted to study the trends of productivity in the economy. According to Gujarati (2009) there are many advantages to using panel data such as raising the sample size substantially which is better for small samples. Moreover, since it studies the cross-sectional variables across time, it gives a better insight of the dynamics of change. To address problems of heterogeneity, the FE specification is useful.

FE allow the regression specification to vary amongst individuals recognising that each cross-sectional unit have unique characteristics thereby allowing observation of those changes. One of its disadvantages however is that it consumes higher degrees of freedom when the number of cross-sectional units is very large. Fortunately, our panel data is considered small and so this does not apply. In the following analysis, an FE panel regression will be conducted, using the production function framework, represented by the following specifications:

$$ln\left(\frac{Sales}{L}\right)_{jt} = \alpha + \beta_1 ln\left(\frac{K}{L}\right)_{jt} + \beta_2 \sum d_t + \beta_3 D(Industry) + \varepsilon_{jt} \quad 6\text{-}6)$$

$$ln\left(\frac{Sales}{L}\right)_{jt} = \alpha + \beta_1 ln\left(\frac{K}{L}\right)_{jt} + \beta_2 ln(\frac{S_{jt}}{L_{jt}}) + \beta_3 \sum d_t + \beta_4 D(Industry) + \varepsilon_{jt} \quad 6\text{-}7)$$

The variables used in these specifications are all taken from the AES dataset, using 55 industries. Equations 6.6 and 6.7 were conducted twice, before and after the policy. Table 6.4 in the results section captures the effect before and after the policy from 2005-2015, taking the logarithmic form of the production function, $ln\left(\frac{Sales}{L}\right)_{jt}$ as the dependent variable representing output per worker. In specification 6-6 a study of output per worker depends on capital per worker per industry $ln\left(\frac{K}{L}\right)_{jt}$, using industries as fixed effects and a base year of 2005 in the *before* analysis and 2011 in the *after* analysis. Moreover, specification 6-7 adds in one more variable, which is the ratio of Saudis working in the private sector to the total number of workers in the private sector represented by $ln(\frac{S_{jt}}{L_{jt}})$. Specification 6-7 also uses industry fixed effects and a *before* and *after* analysis.

6.3.2 Nitaqat Policy Impact

This chapter brings in the impact of *Nitaqat* from Chapter 4 in various ways. Firstly by adding employment proportions for affected firms which is achieved by creating the following two variables: $\frac{L_{rjt}}{L_{jt}}$ and $\frac{L_{yjt}}{L_{jt}}$ denoting the share of employees in Red and Yellow firms over the total number of employees per industry. Secondly, a further division of labour from the *Nitaqat* dataset was taken where a distinction was made between Saudis and foreigners as well as Red and Yellow firms. This generated four variables which are; $\left(\frac{S_{rjt}}{L_{jt}}\right)$ representing the Saudi Employment of Red firms over Total Employment per Industry "*j*" and time "*t*"; $(\frac{S_{yjt}}{L_{jt}})$ Saudi Employment of Yellow firms over Total Employment per Industry "*j*" and time "*t*"; $\left(\frac{F_{rjt}}{L_{jt}}\right)$ Foreign Employment of Red firms over Total Employment

per Industry "*j*" and time "*t*"; and $(\frac{F_{yjt}}{L_{jt}})$ Foreign Employment of Yellow firms over Total Employment per Industry "*j*" and time "*t*".

Using the production function (Equation 6.5), three main specifications were estimated.

$$Log\left(\frac{Sales}{L}\right)_{jt} = \alpha + \beta_1 Log\left(\frac{K}{L}\right)_{jt} + \varepsilon_{jt} \quad 6\text{-}8)$$

$$Log\left(\frac{Sales}{L}\right)_{jt} = \alpha + \beta_1 Log\left(\frac{K}{L}\right)_{jt} + \beta_2\, Log\,(\frac{L_{rjt}}{L_{jt}}) + \beta_3 Log(\frac{L_{yjt}}{L_{jt}}) + \varepsilon_{jt} \quad 6\text{-}9)$$

$$Log\left(\frac{Sales}{L}\right)_{jt} = \alpha + \beta_1 Log\left(\frac{K}{L}\right)_{jt} + \beta_2\, Log(\frac{S_{rjt}}{L_{jt}}) + \beta_3\, Log(\frac{S_{yjt}}{L_{jt}}) + B_4\, Log(\frac{F_{rjt}}{L_{jt}}) + \beta_5\, Log(\frac{F_{yjt}}{L_{jt}}) + \varepsilon_{jt} \quad 6\text{-}10)$$

Specifications 6-8, 6-9 and 6-10 are applied using two different methods, the first of which is the FE Weighted Least Square (WLS) panel analysis. WLS is a special case of Generlised Least Square (GLS) that allows for weights to assign different importance to each industry using the size of the industry, based on number of firms. The WLS regression was necessary here to represent the different weights of industries due to the nature of the small dataset. Therefore, the share of firms per industry was used through probability weights, denoting the inverse of the probability that this observation was sampled. The large difference between weighted and unweighted regressions suggests that the errors may be correlated with the regressors (Cameron and Trivedi, 2009). The second method was cross-sectional analysis to

study the impact of the *Nitaqat* policy across time.

6.4 Results

6.4.1 Before-After Analysis

The FE panel regression specifications 6-6 and 6-7 for the *'before-after'* analysis are;

Table 6.4: Regression results, before and after

Panel FE	*(1)*	*(2)*
Ln $\left(\frac{K}{L}\right)$	0.1673***	0.1558***
	(0.025)	(0.025)
$Ln(\frac{S_{jt}}{L_t})$		0.0723*
		(0.030)
Before		
2006	-0.0346	-0.0434
	(0.078)	(0.077)
2007	-0.0691	-0.0817
	(0.078)	(0.077)
2008	-0.2200**	-0.2362**
	(0.078)	(0.078)
2009	-0.0249	-0.0435
	(0.078)	(0.078)
2010	0.1943*	0.1378*
	(0.077)	(0.080)
After		
2011	0.0309	-0.0254
	(0.078)	(0.082)
2012	0.0334	-0.0270
	(0.078)	(0.082)
2013	0.0857	0.01920
	(0.079)	(0.083)
2014	0.0612	-0.0187
	(0.078)	(0.085)
2015	0.2351**	0.1473*
	(0.078)	(0.086)
FE	✓	✓
N	590	590
R^2	0.391	0.314

Notes: * p < .1, ** p < .05, *** p < .01. Standard errors in parentheses.
Data Sources: Annual Establishment Survey, General Authority for Statistics

The results in column (1) use Equation 6-6 to show the impact of capital per worker (the independent variable) on output per worker (dependent variable), whereas column (2) uses Equation 6-7 that includes an addition of the ratio of Saudis in the private sector's labour market, which is another independent variable that was added in specification 6-7 to study the effect of the share of labour, Saudis, against the foreigners on output per worker. Both specifications are based on 55 industries included as FE using the AES dataset. Results of both specifications provide a similar trend with some variations in the actual growth rate. The capital per worker is highly significant where a 1% rise in capital per worker increases output per worker by around 0.17%. The ratio of Saudi workers in the private sector suggests a positively significant impact on productivity with a 1% increase in the ratio of Saudis in the private sector increasing productivity by around 0.07%.

It is apparent in the results that productivity represented by output per worker has a negative trend compared to the base year of 2005 in the *before* period. This is most likely due to the 2006 stock market crash. In Feburary 2006, the Saudi stock market index (TASI)[25] reached its highest point, following a three-year high streak. The stock market in Saudi Arabia and other GCC countries had risen by almost ten-fold between 2000 and 2005 (SAMA, 2017). After the high point in February the market started to collapse, losing 65% of its value by the end of 2006. We can confidently assume that the negative growth in output per worker in the following years was mainly due to the crash of the stock market as the economy has slowed down as a result. Furthermore, 2008 was the year of the global financial crisis which had a

[25] Tadawul All Share Index (TASI) www.tadawul.com.

higher negative impact on productivity. During the same year, oil prices were at unprecedented highs exceeding $100 per barrel for the first time in history. It is assumed that these high oil prices started to reflect on the Saudi economy and the negative trend started to decline in 2009, before turning into a highly significant positive coefficient in 2010.

The *after* period is also very interesting, as specifications 6-6 and 6-7 appear to have different trends, with column (1) indicating a positive trend reaching a significant 0.23% in 2015. After the ratio of Saudis in the labour market was included to the specification in column (2), it appears that 2011 and 2012 indicate a decline in productivity, which is consistent with our conclusions from Chapter 5, where we assume the introduction of the *Nitaqat* policy did have an impact. Productivity started to recover in 2013, but with the inclusion of the micro firms in 2014, this might have negatively impacted the 2014 results, as these firms are likely to have had lower productivity. Productivity does turn back to a highly positively significant coefficient in 2015. This in in line with the theory of labour demand as suggested earlier that firms need to improve their labour productivity to maintain profitability and remain in the market. The negative results in 2011 and 2012 also confirm the results suggested in the growth accounting exercise.

6.4.2 The Impact of the Nitaqat Policy

We next consider more directly the impact of the *Nitaqat* policy by adding information on Red and Yellow firms as explained above. The specifications in this section use the newly merged dataset bringing in the implication of the *Nitaqat* policy at the industry level using 26 industries. Six new variables were introduced, the first is $(\frac{L_{rjt}}{L_{jt}})$ representing the share of labour in Red firms and the second is $(\frac{L_{yjt}}{L_{jt}})$ indicating the share of labour in Yellow firms. The

variables are then further divided into two colours, *Red and Yellow*, and two nationalities, *Saudis* and *foreigners*.

Table 6.5: FE panel model in relations to the *Nitaqat* policy, weighted and deflated

Panel FE	*(1)*	*(2)*	*(3)*
Ln $\left(\frac{K}{L}\right)$	0.0051	0.0084	0.0071
	(0.014)	(0.015)	(0.016)
Ln $(\frac{L_{rjt}}{L_{jt}})$		-0.0172	
		(0.015)	
Ln$(\frac{L_{yjt}}{L_{jt}})$		-0.0061	
		(0.005)	
Ln$(\frac{S_{rjt}}{L_{jt}})$			-0.0016
			(0.015)
Ln$(\frac{S_{yjt}}{L_{jt}})$			0.0046
			(0.012)
$Ln(\frac{F_{rjt}}{L_{jt}})$			-0.0022
			(0.031)
Ln$(\frac{F_{yjt}}{L_{jt}})$			-0.0003
			(0.026)
D(Year)			
2012	0.0028	0.0026	0.0024
	(0.027)	(0.002)	(0.019)
2013	0.0387*	0.0386*	0.0387
	(0.016)	(0.016)	(0.038)
2014	-0.0227	-0.0220	-0.0219
	(0.022)	(0.022)	(0.047)
2015	0.0200	0.0212	0.0207
	(0.026)	(0.026)	(0.052)
FE	✓	✓	✓
N	125	125	125
R^2	0.5151	0.5306	0.5199

Notes: * p < .1, ** p < .05, *** p < .01. Standard errors in parentheses.
Data Sources:Annual Establishment Survey, General Authority for Statistics, Nitaqat Dataset, MOL, Saudi Arabian Monetary Agency (SAMA)

In this section, a WLS specification was used for equations 6-8, 6-9 and 6-10) to allow for weighing the variables using firms as weights per industry. Column (1) uses specification 6-8 to estimate the effect of capital per worker on output per worker over time using FE. Column (2) studies specification 6-9 in which the labour shares from the Nitaqat dataset were added to the equation. With the dependent variable still being output per worker, the independent variables in column (2) are capital per worker, share of labour in Red firms, and share of

labour in Yellow firms, measured against Green and Platinum share of labour. Time dummies were also included to allow for observation of trend over time. And finally column (3) studies specification 6-10, where the dependent variable is still output per worker, independent variables are capital per worker, and share of labour. The share of labour here is divided into four categories to account for nationality differences in both Red and Yellow firms. the labour variables used are Ln($\frac{S_{rjt}}{L_{jt}}$); representing the share of Saudis in Red firms in the labour market, Ln($\frac{S_{yjt}}{L_{jt}}$); is the share of Saudis in Yellow firms in the labour market, $Ln(\frac{F_{rjt}}{L_{jt}})$; is the share of foreign workers in Red firms, and Ln($\frac{F_{yjt}}{L_{jt}}$); is the share of foreigners in the Yellow firms. Column (3) shows a time trend as a result of time dummies included in specification 6-10.

The time trend shows insignificant results, which might be due to the small dataset that is constructed based on 26 industries. However, there is a positive trend after 2011, confirming that *Nitaqat* was a part of the reason for firms increasing their productivities. There is a suggestion that having more Saudis in Yellow firms raises productivity, although the coefficient is not significant. The percentage of Saudis in Red firms appears to lower productivity and foreign workers also lower productivity in both Red and Yellow firms.

Table 6.6 shows the results when sales per worker are regressed on capital per worker and the proportion of workers in Red and Yellow firms for each year. These results should be treated with caution as the sample size is very small in each regression, at only 26 observations. Nonetheless they suggest that a high proportion of labour in Yellow firms in an industry seems to raise productivity in the later years.

Table 6.6: Labour impact of the policy on productivity

Notes: * p < .1, ** p < .05, *** p < .01. Standard errors in parentheses.

Specification 6-9		*2011*	*2012*	*2013*	*2014*	*2015*
$\ln\left(\frac{K}{L}\right)$	Coef.	0.8451***	0.8823***	0.8827***	0.7931***	0.7136***
	Std. Error	(0.160)	(0.161)	(0.155)	(0.125)	(0.132)
	t	5.27	5.47	5.67	6.33	5.41
Ln $(\frac{L_{rjt}}{L_{jt}})$	Coef.	-0.4867	-0.4662*	-0.3158	-0.2630	-0.1922
	Std. Error	(0.309)	(0.256)	(0.351)	(0.216)	(0.231)
	t	-1.58	-1.82	-1.85	-1.22	-0.83
Ln $(\frac{L_{yjt}}{L_{jt}})$	Coef.	0.0530	0.0029	-0.0375	0.2663*	0.2086*
	Std. Error	(0.121)	(0.105)	(0.122)	(0.105)	(0.109)
	t	0.44	0.03	-0.31	2.55	1.91
N		26	26	26	26	26
R^2		0.5931	0.6234	0.5941	0.5971	0.5345

Notes: * p < .1, ** p < .05, *** p < .01. Standard errors in parentheses.
Data Sources: Annual Establishment Survey, General Authority for Statistics; Nitaqat Dataset, MOL; Saudi Arabian Monetary Agency (SAMA)

Table 6.6 studies specification 6-9 using a cross sectional analysis to observe the change of variables over time. The dependent variable here is output per worker, regressed on capital per worker, and share of labour in Red firms and Yellow firms against the Green and Platinum share of labour. Each year is studied separately to observe the change over time.

These results are consistent with those of Chapter 5, where 2014 and 2015 show positive impacts on productivity. Meanwhile, the Red firms show negative relations across all years, although these are largely insignificant other than a weakly significant result in 2012. This could suggest that since the Yellow firms are immediately under the quota cut-off rate, the theory of the labour demand is applicable on these Yellow firms, where they are able to improve their productivity and upgrade to the Green category more easily than the Red firms. The Red firms need to upgrade twice, from Red to Yellow, and then subsequently from Yellow to Green in order to be compliant and start receiving the benefits. This puts high pressure on Red firms and, as suggested by the results above, they appear not to be able to

raise productivity to compensate. This is evidence in favour of the theory proposed by Welch (1976) who suggested that in an economy-wide quota system with two groups, productivity will decline for the lower group, as the quota is simply too high for them to reach.

Finally we examine the results year-on-year when we divide labour by Saudis and foreigners in Red and Yellow firms. Again we caveat that the sample size is relatively small.

Table 6.7: Impact of the *Nitaqat* policy on labour productivity using deflated variables in a cross-sectional analysis

	(1) $Ln\left(\frac{K}{L}\right)$	*(2)* $ln(\frac{S_{rjt}}{L_{jt}})$	*(3)* $Ln(\frac{S_{yjt}}{L_{jt}})$	*(4)* $Ln(\frac{F_{rjt}}{L_{jt}})$	*(5)* $ln(\frac{F_{yjt}}{L_{jt}})$	*N*	R^2
2011	0.6633***	-0.5528*	0.8554*	0.0921	-1.0951**	26	0.7873
	(0.101)	(0.228)	(0.322)	(0.155)	(0.357)		
2012	0.8204***	-0.8932*	0.8286*	0.0375	-1.0583*	26	0.7139
	(0.125)	(0.332)	(0.371)	(0.230)	(0.435)		
2013	0.8553***	-1.2076**	1.4875**	0.9584*	-1.9588**	26	0.7710
	(0.171)	(0.395)	(0.466)	(0.387)	(0.541)		
2014	0.4939***	-1.0019*	1.3493**	0.5120*	-1.5584**	26	0.7507
	(0.093)	(0.388)	(0.404)	(0.271)	(0.442)		
2015	0.1721	-0.5554	0.7823	-0.0802	-0.7732	26	0.5422
	(0.195)	(0.497)	(0.511)	(0.522)	(0.645)		

Notes: * p < .1, ** p < .05, *** p < .01. Standard errors in parentheses.
Data Sources: Annual Establishment Survey, General Authority for Statistics; Nitaqat Dataset, MOL; Saudi Arabian Monetary Agency (SAMA)

Table 6.7 studies specification 6-10 using a cross sectional analysis. Where the dependent variable is output per worker, regressed on capital per worker, and the share of labour is divided into four categories rather than two. the labour variables used are Ln($\frac{S_{rjt}}{L_{jt}}$); representing the share of Saudis in Red firms in the labour market, Ln($\frac{S_{yjt}}{L_{jt}}$); is the share of Saudis in Yellow firms in the labour market, $Ln(\frac{F_{rjt}}{L_{jt}})$; is the share of foreign workers in Red firms, and Ln($\frac{F_{yjt}}{L_{jt}}$); is the share of foreigners in the Yellow firms. Each year is studied

separately to observe the change over time.

This division gives a better insight on the impact of the *Nitaqat* policy since it distinguishes between nationalities in both treated colour groups, which is the main goal of the policy. Column (2) and (4) show the results for Red firms; there is a negative significant relationship as the share of Saudis increases in Red firms, and an opposite trend for foreigners. The foreigners in Red firms show an insignificant impact on labour productivity in three years but have a highly significant positive impact in 2013 and 2014, which is most probably due to the addition of the micro firms to the policy during that time. As Red firms are far behind the quota, the Saudis indicate lower productivity because it might result in hindering their daily operation since they are not actually required but rather they are imposed by *Nitaqat*.

Column (3) and (5) observe the trend in the Yellow firms for Saudis and foreigners, Foreigners in Yellow firms have highly significant negative impacts. Therefore for Yellow firms, adding Saudi employees raises productivity and adding foreigners would reduce it. The big negative impact of foreign employees in Yellow firms is because Yellow firms are the targeted group in this policy, they are immediately below the cutoff to upgrade to the Green category. Therefore, the higher the share of the foreigners in Yellow firms, the lower their *Saudization* rate would be. This leads to the continuation of the sanctions and added costs and makes the firm more restrictive in the market which explains the significant negative impact.

6.5 Conclusion

This chapter studied productivity using three different methods; growth accounting, *'before-after'* analysis, and the implication of *Nitaqat*. The 'before-after' analysis used an industry

level FE panel regression with 55 industries included using the AES dataset from *2005-2015*. Meanwhile, the implication of *Nitaqat* has used the merged dataset of AES and *Nitaqat,* reducing the sample to only 26 industries. Both panel and cross-sectional analysis over time were used in this section. The panel regression used was a FE WLS analysis. The WLS was used to allow for firm weights to give more accurate results and weights for different industries due to the small sample nature of the dataset. The cross-sectional analysis over time was used afterwards to bring in the implication of the *Nitaqat* on productivity distinguishing between nationalities and Yellow and Red firms.

Results are consistent throughout this chapter, demonstrating that productivity has declined in the first two years 2011-12, but shows a tendency to increase thereafter. It is suggested by labour demand theory and the literature on the impact of minimum wage on productivity, that for firms to stay in the market and continue being profitable, they must raise their productivity. After adding the *Nitaqat* labour data to measure the impact of the policy on labour productivity, the policy was found to have a positive significant effect on the Yellow category for Saudi employees, and a negative effect as the share of foreign employment increases. This could indicate that Yellow firms are benefitting from the policy as their labour productivity is increasing with the addition of Saudi workers. Meanwhile, the Red category displays an opposite effect, where adding Saudis would significantly reduce their labour productivity, and an addition of foreigners would raise it. Therefore, with Red firms believed to have a higher share of the small and micro firms (which is the bigger size group in the economy in the beginning of the policy implementation), it has a greater effect on the economy as a negative labour productivity in the first two years. However, because the policy has extremely strict rules, most firms were forced to either raise their productivity or exit the market, resulting in a productivity increase over time.

6.A Appendix

Growth Accounting Exercise using S=0.5

S=0.5, L =hour worked

Table 6.8: Growth Accounting results using S=0.5, L =hour worked

	(1)	*(2)*	*(3)*	*(4)*
Year	$\Delta ln(Y/L)$	$\Delta ln(K/L)$	$S\Delta ln(K/L)$	$\Delta ln(A)$
2007	0.24	9.60	4.80	-4.56
2008	3.23	16.35	8.17	-4.94
2009	-6.14	-17.27	-8.63	2.50
2010	-0.70	13.38	6.69	-7.39
2011	-7.80	0.08	0.04	-7.84
2012	-0.55	1.62	0.81	-1.36
2013	2.49	2.34	1.17	1.32
2014	7.72	5.18	2.59	5.13
2015	3.91	-15.47	-7.73	11.65

Growth Accounting Exercise using S=0.5

S=0.5, L =Number of workers

Table 6.9: Growth Accounting results using S=0.5, L =Number of workers

	(1)	*(2)*	*(3)*	*(4)*
Year	$\Delta ln(Y/L)$	$\Delta ln(K/L)$	$S\Delta ln(K/L)$	$\Delta ln(A)$
2007	-2.45	6.91	3.46	-5.91
2008	1.70	14.81	7.41	-5.71
2009	-5.39	-16.53	-8.26	2.87
2010	-2.64	11.44	5.72	-8.36
2011	-5.68	2.20	1.10	-6.78
2012	-0.08	2.09	1.04	-1.13
2013	1.60	1.45	0.72	0.88
2014	0.75	-1.78	-0.89	1.65
2015	-0.76	-20.14	-10.07	9.31

The following table reports the results of specifications 6-6 and 6-9 only for the *before* period, where the regression is against the year 2005.

Table 6.10*:* *before* period, where the regression is against the year 2005.

		(1)	*(2)*
Panel FE		*Specification (6-8)*	*Specification (6-9)*
Ln $\left(\frac{K}{L}\right)$	*Coef.*	0.2188***	0.2106***
	Std. Error	(0.042)	(0.042)
$Ln(\frac{S_{jt}}{L_t})$	*Coef.*		0.0888*
	Std. Error	-	(0.043)
D(Year)			
2006	*Coef.*	-0.0321	-0.0425
	Std. Error	(0.062)	(0.061)
2007	*Coef.*	-0.0646	-0.0795
	Std. Error	(0.062)	(0.062)
2008	*Coef.*	-0.2125**	-0.2316***
	Std. Error	(0.062)	(0.062)
2009	*Coef.*	-0.0160	-0.0377
	Std. Error	(0.062)	(0.062)
2010	*Coef.*	0.1676**	0.0957
	Std. Error	(0.063)	(0.072)
FE		✓	✓

The following table reports the results of specifications 6-8 and 6-9 only for the *after* period, where the regression is against the year 2011.

Table 6.11: *after* period, where the regression is against the year 2011.

		(1)	*(2)*
Panel FE		*Specification (6-8)*	*Specification (6-9*
Ln $\left(\frac{K}{L}\right)$	*Coef.*	0.0306	0.0197
	Std. Error	(0.028)	(0.028)
$Ln(\frac{S_{jt}}{L_t})$	*Coef.*		0.1912**
	Std. Error	-	(0.072)
D(Year)			
2012	*Coef.*	0.0176	0.0047
	Std. Error	(0.016)	(0.017)
2013	*Coef.*	0.0786***	0.0485*
	Std. Error	(0.017)	(0.020)
2014	*Coef.*	0.0492**	-0.0157
	Std. Error	(0.017)	(0.030)
2015	*Coef.*	0.2209***	0.1354
	Std. Error	(0.016)	(0.036)
FE		✓	✓

Table 6.12: Industry classification differences in different datasets.

New Industry Number	*Nitaqat Dataset 2012*	*Establishment Survey Industry 2012*
4. Wholesale and Retail Trade	1 Wholesale & Retail Trade 50 Petrol Stations 7 Pharmacies 10 Trade Gold & Jewelry	45 Wholesale & retail trade and repair of motor vehicles & motorcycles 46 Wholesale trade, except of motor vehicles and motorcycles 47 Retail trade, except of motor vehicles and motorcycles
5. Personal Services	2 Personal Services 35 General office services	96 Other personal service activities
6. Manufacturing	3 Manufacturing 40 Cement Industry	14 Manufacture of wearing apparel 13 Manufacture of textiles 32 Other manufacturing 23 Manufacture of other non-metallic mineral products 24 Manufacture of basic metals 25 Manufacture of fabricated metal products 26 Manufacture of computer, electronic and optical products 27 Manufacture of electrical equipment 28 Manufacture of machinery and equipment n.e.c. 29 Manufacture of motor vehicles, trailers and semi-trailers 30 Manufacture of other transport equipment 31 Manufacture of furniture 12 Manufacture of tobacco products 15 Manufacture of leather and related products 16 Manufacture of wood and of products of wood and cork 19 Manufacture of coke and refined petroleum products 20 Manufacture of chemicals and chemical products 17 Manufacture of paper and paper products 21 Manufacture of products and preparations pharmaceutical
7. Construction	4 Building Materials & Construction 43 Ready-mixed Concrete 54 Government Construction contracting 25 Construction Maintenance & Hygiene, Employment & Subsistence	41 Construction of buildings 42 Civil engineering 43 Specialized construction activities

8.	**Social & Community Services**	87 Social & Community Services	88 Social work activities without accommodation
9.	**Workshops & Maintenance Shops**	8 Workshops & Maintenance Shops	33 Repair and installation of machinery and equipment 95 Repair of computers and personal and household goods
7.	**Food & Nutrition Services**	9 Nutrition Services 13 Bread and Bakery Trade	56 Food and beverage service activities 10 Manufacture of food products 11 Manufacture of beverages
8.	**Accommodation & Tourism**	11 Accommodation & Tourism	55 Accommodation 87 Residential care activities 79 Travel agency, tour operator, reservation service & related activities 93 Sports activities and amusement and recreation activities 90 Creative, arts and entertainment activities 91 Libraries, archives, museums and other cultural activities
9.	**Land Transport**	49 Road Transport of Passengers outside Cities 38 Road Transport of Goods in Cities 20 Road Transport of Passengers in Cities 51 Road Transport of Goods outside Cities	49 Land transport and transport via pipelines
10.	**Agriculture, Fishing & Horse Grazing**	14 Agriculture, Fishing and Horse Grazing 15 Farmers, Fishermen and Shepherds	3 Fishing and aquaculture 2 Forestry and logging
11.	**Consulting Services & Business**	16 Consulting Services & Business	70 Activities of head offices; management consultancy activities 69 Legal and accounting activities 71 Architectural and engineering activities; technical testing & analysis 73 Advertising and market research 74 Other professional, scientific and technical activities 77 Rental and leasing activities
12.	**Health Services**	17 Health Services	86 - Human health activities

13. Insurance & Business Services	18 Insurance & Business Services	65 Insurance, reinsurance and pension funding 66 Activities auxiliary to financial service and insurance activities 82 Office administrative, office support & other business support act's 94 Activities of membership organizations
14. Agriculture & Livestock Production	19 Agriculture & Livestock Production	1 Crop and animal production, hunting and related service activities 75 Veterinary activities
15. Education	29 Foreign Schools 33 Private & Public Schools for Girls 36 Private & Public Schools for Boys 41 Kindergarten 44 Institutes and colleges 48 Private & Public Schools for Girls & Boys	85 Education
16. Oil & Gas Extraction	88 Oil & Gas Extraction	06 Extraction of crude petroleum and natural gas
17. Petrochemical, Coal & Rubber	23 Petrochemical, Coal & Rubber	22 - Manufacture of rubber and plastics products
18. Printing, Publishing & Media	24 Printing, Publishing & Media	18 Printing and reproduction of recorded media 58 Publishing activities 59 Motion picture, video & tv programme production, sound recording 60 Programming and broadcasting activities
19. Financial Institutions	26 Financial Institutions (Banks)	64 Financial service activities, except insurance and pension funding
20. Collection offices & Real Estate Services	27 Collection offices & Real Estate Services	68 Real estate activities
21. Mines & Quarries	53 Stone, granite and bricks 28 05 Mining of coal and lignite Mines & Quarries	05 Mining of coal and lignite 07 Mining of metal ores 08 Other mining and quarrying 09 Mining support service activities
22. Air Transport	30 Air transport	51 - Air transport

23. Electricity, Gas & Water	31 Electricity, Gas & Water	35 Electricity, gas, steam and air conditioning supply 36 Water collection, treatment and supply 37 Sewerage 39 Remediation activities and other waste management services 38 Waste collection, treatment & disposal activities; materials recovery
24. Water Transport	32 Sea Transport	50 Water transport
25. Storage	34 Storage	52 Warehousing and support activities for transportation
26. Communications	37 Communications	61 Telecommunications 53 Postal and courier activities
27. Information Technology	42 Information Technology	62 Computer programming, consultancy and related activities 63 Information service activities
28. Security Guards	45 Security Guards	80 Security and investigation activities
29. Laboratory	46 Laboratory	72 Scientific research and development
30. Employment Activities	40 Agents of Private Recruitment 47 Private Employment Offices	78 Employment activities
31. Maintenance and operation Contracting	52 Maintenance and operation Contracting	81 Services to buildings and landscape activities

Chapter 7 Conclusion

7.1 Summary and Conclusion

Saudi Arabia had two main stages of its nationalisation efforts: 1995-2010 and 2011 to date. The efforts towards "*Saudization*" in 1995-2010 were similar to those of other GCC countries. Industries were categorised (11 in total) with unreasonable targets requiring around 30% Saudi workers for almost all industries. These targets were impossible to meet on a large economic scale. In 2011, unemployment rates reached 12% among Saudis, with 30% of Saudi females being unemployed (SAMA,2016). Meanwhile, the private sector was comprised of 90% foreign workers. In the context of a dual labour market and migration theories, the government intervened by issuing the *Nitaqat* policy on the private sector in 2011 in an attempt to solve the rising problem of unemployment and reduce reliance on foreign labour. This policy has categorised the private sector into four colour ratings based on compliance; from low to high: Red, Yellow, Green, and Platinum. The minimum cut-off for compliance is the Green category. *Nitaqat* was strictly enforced on the private sector to the point that many government services would stop if the firm was not compliant. This instantly added high compliance costs on the private sector as they had to hire Saudi workers whose wages far exceeded those of foreigners.

This thesis has analysed the impact of the *Nitaqat* policy on the labour market and productivity, bringing in original analyses of different datasets at the firm, individual and industry levels. Most of the existing literature on *Saudization* is limited to descriptive quantitative analysis and qualitative assessment, this is mainly due to the lack of micro data in the country. This thesis uses original detailed dataset on the whole population of the

private sector at the firm level from the Saudi Ministry of Labor on the *Nitaqat* program. This facilitated an econometric approach to evaluate the program, producing original results and conclusions. We were also able to acquire the administrative dataset *GOSI* for chapter 5*,* which has allowed the study of earnings function allowing for original insights into the wage structure between nationals and non-nationals as well as the difference between males and females. The third dataset used in chapter 6 was created in this research where a merge between the AES and the Nitaqat dataset from chapter 4 to allow for productivity estimation. All three datasets are unique and has produced original results in all the empirical chapters.

To summarise, Chapter 2 gave a brief historical background about the Saudi labour market. It also introduced the *Nitaqat* policy, explaining the difference between the colours, its mechanisms, rewards and sanctions, and the different debates in the local literature about the impact of the policy to the labour market. Chapter 3 discussed the relevant literature; it considered the theory of labour demand on operation of labour markets such as dual labour markets and impacts of migration, as well as policies that address labour market issues such as affirmative action, and the productivity literature. Chapters 4 through 6 used an econometric approach to analyse the impacts of this policy on labour markets and productivity.

Chapter 4 analysed the effect of *Nitaqat* on the Saudi private sector labour market. We were able to acquire and use the original dataset of *Nitaqat* from the Ministry of Labor with data from 2011 to 2015 and analyse the time-pattern of the impact of the policy. The analysis used a difference-in-differences technique, where the treatment groups were the Red and Yellow firms, and the control group was the Green firms, and 2011 was a base year. The model was used in different specifications to study the policy's impact on: the *Saudization* rate; Saudi,

foreign, and total employment[26]; and the exit rate of firms. The results suggested that the *Saudization* rate has improved since the policy implementation by 10%. However, this occurred due to the significant decline in foreign labour rather than the increase in Saudi employment. The increase in Saudi employment was only significant in 2012, with an average increase of one Saudi employee per firm in the affected Red and Yellow firms compared to the Green firms. Meanwhile, the fall of foreign employment was significant across time to reach 18 fewer employees per firm in the Red category, and nine employees fewer per firm in the Yellow category in comparison to the Green category in 2015. These results were also reflected in total employment in the private sector declining by an average of -42.5% per firm in the Red category and -34% per firm in the Yellow category. As for the exit rate, the private sector had significant high exit rates since the implementation of the policy, reaching 17% in 2013, the exit rate declines slightly in 2014 and 2015 to around 15%. Several robustness checks were used in the chapter, which provide similar results.

Chapter 5 provided a unique study into the Saudi labour market's wage structure before and after the policy introduction. It used the GOSI dataset from 2009 to 2015. GOSI is one of the oldest and most established administrative, individual level datasets in Saudi Arabia. Mincer (1947) wage equations were used to study the time pattern of hourly wage change and by characteristic, Age, Saudis and non-Saudis, gender and skill. The large sample size also allowed an analysis by industry. Although this chapter was not able to bring in the impact of *Nitaqat*, it allowed us to observe the impact of skills, gender, and nationality on growth in hourly wage. For Saudis, results suggest that hourly wage had negative growth in 2011 and 2012, and increased growth thereafter, suggesting similar patterns in labour productivity.

[26] Employment was measured by growth rate and growth in number of employees.

Non-Saudis had a positive growth throughout the time trend, with smaller growth rates in 2011 and 2012, which then increased from 2013 to 2015. Furthermore, being a high skilled worker from both nationalities had a positive and significant impact on hourly wage across time, with a higher increase in 2014 and 2015. In the low skilled category, Saudis showed an increasingly significant negative trend in hourly wages across time. Foreigners showed a similar trend except for 2015 where the relationship becomes significantly positive which suggests a high reliance on foreign low skilled workers in the private sector.

The *Gender* variable, representing females against males, was very interesting as the relationship was negatively significant in 2012 and before, however, it then turns into positive significance from 2013 to 2015. This could be an impact of the *Nitaqat* policy but further studies need to be conducted to confirm causality. However, the policy aims to increase female employment in Saudi Arabia since historically, job opportunities for women were limited to education or the healthcare sector. Change is happening in Saudi Arabia and the policy has opened doors for women especially as an immediate replacement for foreign workers at the time of implementation since there were high unemployment rates for Saudi women.

Chapter 6 merged the *Nitaqat* dataset with the Annual Establishment Survey 'AES', allowing for the study of total factor productivity in relation to *Nitaqat* at the industry level. Although the merged dataset produced only 26 industries, this chapter is a good starting point for productivity analysis as it allows estimation of the impact of *Nitaqat* on aggregate productivity. The chapter starts with a growth accounting exercise as it provides a good benchmark for economic performance analysis. Both labour productivity and TFP had negative trends from 2009 to 2012 but showed positive growth from 2013 onwards. This is

consistent with basic labour demand theory, of initially slow or negative productivity growth, followed by an upturn.

Using the production function framework, the chapter then analyses the trend of output per worker 'before and after' the policy, from 2005 to 2015 using the AES dataset of 55 industries, the time trend suggests that from 2006 to 2012, output per worker had negative growth, then from 2013 onwards, results seem to be positive. To suggest causality with *Nitaqat*, the merged data was used through different specifications for the production model where we first analysed output per worker regressed on the capital labour ratio, the share of Red workers and the share of Yellow workers using an FE panel regression. The results suggested the addition of the Red and Yellow firms have a negative relationship to TFP, yet TFP still had positive growth from 2012 to 2015, excluding 2014 which is affected by the introduction of micro firms. The third specification of the FE panel model, differentiated between the share of Saudis and foreigners in both Red and Yellow firms. Results show a negative relationship with TFP between all variables in this specification, except for the share of Saudis in the Yellow firms. This might suggest that Yellow firms are benefitting from the policy and the increase of Saudi workers as opposed to the Red firms who are experiencing a negative relationship. The TFP time dummies follow the second specification by having positive growth in TFP except for 2014. Furthermore, specifications five and six examined the results year-on-year, with specification five dividing by share of Red and Yellow firms, and six by adding the share of nationalities in both Red and Yellow firms. With the caveat of very small sample sizes, specification five suggests a positive relationship of the share of workers in the Yellow category on TFP whereas the share of workers in Red firms shows a negative relationship across time. Specification six suggests that the share of Saudis in Yellow firms has a positive relationship across time which might suggest that this category is

the one that benefits most from the policy and may be able, in time, to raise their productivity to stay in the market as they are just below the quota required. Meanwhile, a rise in the share of foreign workers in the Yellow firms suggests a decline in TFP. In Red firms, the share of Saudis is negatively impacting TFP suggesting that Red firms might not be able to adjust to the extra costs of employing Saudis. This is also suggested by the positive relationship Red firms show for the share of foreigners, which suggests that having foreign workers improves their productivity and the policy is preventing them from realising these benefits. This is consistent with the findings in Chapter 4 where Red firms had the higher rate of exits since the start of the policy.

In Conclusion*, Nitaqat* is suggested to have many implications on the private sector labour market in Saudi Arabia. Chapter 4 has found that *Saudization* has increased since 2011, the ratio of Saudis in the private sector has increased to 20% in comparison to the 10% prior to *Nitaqat*. This is mainly due to the vast decline in foreign employment rates rather than the increase in Saudi employment. Exit rates of firms from the private sector were increasing since 2011 reaching 17% increase in 2013. Chapter 5 analysed the earning function in the Saudi labour market, comparing gender, nationality and skill. The main contribution found in this chapter is that females show positive earnings when compared to men only after 2012. This indicated a positive outlook for females in the Saudi labour market, as female unemployment has been very high due to the restrictions on their employment in the private sector. Chapter 6 introduces an indication of productivity effect of *Nitaqat* on the labour market, and it was found that productivity has suffered in the first two years after the implementation of *Nitaqat* and then it showed recover, in line with labour demand theory, where the most productive were able to allocate their resources to improve productivity to raise profitability and continue to exist in the market. Firms who are less productive have

exited the market, indicating that in the long run productivity would increase in the private sector. *Nitaqat* has also helped improve statistical analysis on the private sector, as the dataset provided a good measurement tool to evaluate and follow the private sector. Prior to *Nitaqat*, the data was scattered between different governmental bodies, such as GOSI, the Ministry of Labor, the Ministry of Economy and Planning, and the General Authority for Statistics. However, the enforcement of *Nitaqat* has brought these datasets together. That said, it would have been ideal if the *Nitaqat* dataset had an output variable to enable the analysis of productivity at the firm level.

Although the policy is somewhat specific to the Saudi labour market, it can provide a good case study to other countries with similar labour market characteristics such as the labour market duality or significant inward migration. Moreover, similar policies are applied in other GCC countries, although to a lesser extent, who are also rentier economies with a dual market. The analysis of this thesis might be beneficial to them. This thesis also relates to the literature on dual labour market with immigrants being in the secondary market (De Coulon, 2004). Furthermore, another relevant strand of literature is the literature on the affirmative action policy in the US and other similar policies around the world (Holzer and Neumark, 2000). *Nitaqat* is the first policy that was applied to the whole economy and therefore, with the increased productivity in the labour market, the results from this thesis might benefit economies with similar characteristics of duality.

7.2 Limitations and Further Work

Data acquirement was a very big achievement for this research as the policy is unique, and it was interesting to study its impact. However, due to the difficulty of data collection and high confidentiality in the region, we were not able to receive output data of firms in the *Nitaqat* dataset. Doing so would have allowed us to study the effect of the program on productivity on the firm level giving us a more detailed result on firm productivity in relation to different colours over time. Instead we had to rely on a small sample analysis of industries which limited our scope to investigate impacts on productivity using more sophisticated econometric methods.

Another limitation in the *Nitaqat* chapter was that the data was only collected after the implementation of the policy. Therefore, in the study of before and after using the difference-in-differences model, we had to rely on the first set of data collected after the policy when the majority of firms had not yet adjusted to the policy.

As for future work, it is interesting to explore the impact of the *Nitaqat* policy on Foreign Direct Investment (FDI). Since 2011, FDI inflows have been declining and the global competitiveness report (2017-2018) lists the most problematic factors of doing business in Saudi Arabia as the "restrictive labour regulations". Could the *Nitaqat* policy be hindering the chances of foreign investors from entering the market? We, especially note that the third most problematic factor is the "inadequately educated workforce" which makes the market even less attractive if a foreign investor must hire a large percentage of nationals.

There is a trend of data collaboration across different governmental bodies at a macro level.

However, it is still at its initial stages. It is possible that future research can have accessibility to better data. There is also availability of individual and firm level administrative datasets that are very difficult to acquire, due to confidentiality restrictions. There are possible chances that clear laws can be introduced to reduce these restrictions to alleviate the level of research that is conducted on the region. Although administrative data is useful at this stage, more data collection for research based such as surveys, need to be conducted at both macro and micro level to account for different variables that are needed for econometric analysis yet are not found in administrative data. For example, the sales variable is not relevant for administrative purposes in the Nitaqat dataset. However, its addition into the *Nitaqat* dataset would allow researchers to be able to measure labour productivity per firm.

The effect of Nitaqat on immigration is also an interesting avenue for future research as Saudi Arabia is one of the top five destinations for labour migration. With added costs on foreign labour in the country, how has this affected immigration, and what is the future economic outlook for the foreign worker in the Saudi labour market?

Moreover, another research avenue that would be beneficial, is using the matching function to match labour market demand, supply and reduce the cost of market frictions. This is to match educational outcomes to labour market needs. The research attempted to explore this aspect in the early stages of the PhD, however, due to data limitation, it was not possible.

The research so far has shown initial positive impacts on female employment from 2011 and onwards. Future research could focus and shed light on female employment, especially with the reduction in restrictions to female employment in the country, such as the removal of the female driving ban in 2018. How would this effect female employment? It would be interesting to collect data before and after the policy and study the economic effect and

outcome. Furthermore, with the transformation programs that are taking place all across the kingdom guided by Vision 2030, the question that poses itself is “how does Nitaqat play a role in that vision?” What are the economic implications of different avenues of vision 2030 on economic development of the Kingdom?

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