

Can Hiring Quotas Work? The Effect of the Nitaqat Program on the Saudi Private Sector[†]

By JENNIFER R. PECK*

This paper studies the effects of quota-based labor regulations on firms in the context of Saudi Arabia's Nitaqat program, which imposed quotas for Saudi hiring at private firms. I use a comprehensive firm-level administrative dataset and exploit kinks in hiring incentives generated by the quotas to estimate the effects of this policy. I find that the program increased native employment at substantial cost to firms, as demonstrated by increasing exit rates and decreasing total employment at surviving firms. Firms without any Saudi employees at the onset of the program appear to bear most of these costs. (JEL J08, J23, J68, K31, L25, O15, O17)

Many countries have used quotas and affirmative action policies to favor members of disadvantaged or underrepresented groups. These policies aim to increase the representation of these groups in a variety of areas, including elected positions, education, and employment (Fryer and Loury 2013, Sowell 2005). Government-mandated quotas and group preferences are frequently applied in labor markets, both to civil service positions and to employment at private sector firms. Affirmative action in the United States, for example, applies to government jobs as well as to private firms with government contracts. The New Economic Policy regulations in Malaysia and postapartheid employment equity policies in South Africa apply to both public and private sector jobs.

One of the key issues regarding these types of quota-based labor policies is the trade-offs they impose between their benefits to targeted groups and the costs to other workers and firms. Theoretical models yield ambiguous predictions regarding the efficiency impacts of these policies, and the net effects depend on both the type of discrimination being modeled and the particular labor market context (Holzer and Neumark 2000). Empirical evidence on the effects of these policies in various settings is therefore essential.

*Department of Economics, Swarthmore College, 500 College Avenue, Swarthmore, PA 19081 (e-mail: jpeck1@swarthmore.edu). I gratefully acknowledge the support of the Labor Market Decision Support System project at the Center for Complex Engineering Systems at the King Abdulaziz City for Science and Technology in Saudi Arabia and the Massachusetts Institute of Technology. I am extremely grateful to Michael Greenstone and David Autor for their extensive feedback and to Ahmed Fadol for his considerable assistance with this project. I also thank the rest of the LMDSS team for their support and advice. Miikka Rokkanen, Heidi Williams, and seminar participants at MIT contributed many helpful comments and suggestions. The paper has also benefited substantially from the feedback of several anonymous referees.

[†]Go to <https://doi.org/10.1257/pol.20150271> to visit the article page for additional materials and author disclosure statement or to comment in the online discussion forum.

This paper examines one of the world's largest quota-based labor policies and estimates the effect of these hiring quotas on employment and firms. The (ongoing) Nitaqat policy was enacted in Saudi Arabia in 2011 and requires Saudi private sector firms to meet specific employment quotas for Saudi nationals. This policy is attractive to study for several reasons. First, the Nitaqat program regulated all private sector firms with more than ten employees, making it one of the most broadly applied of such quota policies. The quotas were also rigorously enforced, with sanctions triggered automatically for noncompliant firms. Quota compliance was also carefully monitored through the government's integrated social security and visa records. The policy was therefore both clearly defined and well enforced, yielding an attractive setting to identify the firm-level policy impacts.

In addition to providing important evidence on the effects of quota-based labor policies more broadly, Nitaqat also offers a window into the likely effects of government efforts to use quotas to address the combined issues of high native unemployment and dependence on foreign labor. This combination of labor market features is common in oil-rich countries, where slow growth in the non-oil sector has led to rising unemployment, particularly among youth.¹ As a result, these policies have become increasingly popular in the oil-exporting countries of the Middle East, where quota-based initiatives are now a core government strategy to address youth unemployment. These policies now exist in all six countries of the Gulf Cooperation Council (GCC): Saudi Arabia, Bahrain, Oman, Kuwait, Qatar, and the United Arab Emirates. These quotas are seen as a crucial tool to address the political instability caused by high native unemployment, especially in the wake of the Arab Spring uprisings in 2011 and 2012. The large migrant populations in these countries are also seen by elites as potentially politically destabilizing, making nationalization efforts highly politically desirable (Randeree 2012, Al-Dosary 2004, and Al-Lamki 1998). Until recently, however, these programs had been relatively narrow in scope and largely unenforced (Randeree 2009). Nitaqat was one of the first of these policies to be enforced on a large scale, and was unprecedented in the breadth of its scope as well as its rigorous enforcement and close monitoring. Because of this, the Nitaqat program is a key test case to measure the potential of these programs to combat unemployment as well as an important case study for how the costs imposed by such quotas might restrict the growth of targeted firms.

This paper focuses on two main questions: has Nitaqat been successful in increasing the number of Saudis in the private sector; and what were the costs to firms? To answer these questions, I employ a comprehensive dataset on the full universe of Saudi private sector firms used by the Ministry of Labor to administer the program. The data are particularly notable for wide coverage and high quality, as employment submissions from firms were automatically checked against government social security and visa records. This is the first time that such establishment-level data has been made available to researchers.

¹ Until recently, many of these countries had used public sector employment as a way to combat unemployment and redistribute oil wealth. This strategy has become unsustainable as population growth has rapidly outpaced growth in oil revenues (Forstenlechner and Rutledge 2010; Forstenlechner et al. 2012; and El-Katiri, Fattouh, and Segal 2011).

The main empirical strategy exploits a kink in the incentive to increase Saudization generated by industry-level Nitaqat quotas. I use a regression kink design (RKD) to estimate the causal effect of the Nitaqat program on firms near the quota cutoffs in terms of program “benefits” (Saudization, Saudi hiring, and expatriate downsizing) as well as program “costs” in terms of firm size and exit.² I also use a differences-in-differences approach to provide an approximate estimate of the overall effects.

The analysis finds that the program succeeded in increasing Saudi employment, but did so at significant cost to firm growth and survival. Program compliance rates were very high, as 69 percent of surviving firms added Saudi workers and/or decreased expatriate workers to bring their workforce into line with the new regulations. Firms met the new quotas primarily by hiring Saudis, and my differences-in-differences estimates indicate that Nitaqat was responsible for the addition of roughly 63,000 Saudi workers to existing private sector firms over a 16-month period, a sizable share of the approximately 169,000 new Saudi workers in total employed at these firms over the same period. New entrants also tended to have higher Saudi employment rates, accounting for an additional 30,000 positions for Saudi workers in these firms.

At the same time, the program had a significant impact on exit rates, with the probability of exit increasing in a firm’s distance below the quota at baseline. Overall, I estimate that the Nitaqat program caused 11,000 firms to shut down, raising exit rates from 19 percent to 28 percent over the period. The increase in exit rates was concentrated among firms with no Saudis at baseline, suggesting that there may have been large fixed costs associated with hiring Saudis. Surviving firms also tended to shrink in terms of the total number of employees, and the program decreased total private sector employment at these firms by 948,000 workers.

The rest of the paper proceeds as follows. Section I summarizes some previous work on labor market quota programs. Section II describes the structure of the Nitaqat program, and Section III describes the data used in this analysis. Section IV outlines the RKD empirical strategy, its application to the analysis of the Nitaqat program, and reports the relevant identification checks. Section V reports the main results and some extensions and Section VI concludes.

I. Background: Previous Literature

The analysis of the Nitaqat program relates to a large literature in labor economics on the effects of affirmative action and employment quota programs. The most well studied of these are affirmative action policies in the United States, and Holzer and Neumark (2000) provides a comprehensive review of these studies. Most of this literature has focused on the effects of affirmative action on employees: Chay (1998), for example, finds improvements in both employment and earnings for black men associated with the extension of the Equal Employment Opportunity Act to small firms. There are also several studies that have attempted to estimate the

²I follow the convention of referring to migrant workers as “expatriates” in this context. This terminology is used to indicate both the broad skill spectrum of these guest workers as well as their temporary residence in the country.

effects on firms. Griffin (1992), for example, estimates establishment-level translog cost functions for firms that were government contractors (and therefore subject to affirmative action regulations) and for firms that were not in the contracting sector. He finds that the labor costs of contracting firms were 6.5 percent higher than those of non-contracting firms. In the absence of exogenous variation in which firms were exposed to the regulation, however, it is difficult to know how much of these differences are attributable to affirmative action alone. There are also several recent papers on employment quota programs outside of the United States. Recent studies by Howard and Prakash (2012), Chin and Prakash (2011), and Prakash (2009), for example, have examined the effect of Indian minority hiring quotas on employment outcomes and occupational choice of favored groups. These studies find that these programs increased the probability of finding a salaried job for some types of favored groups, and that this improved employment outcome was associated with higher household consumption expenditures and higher skilled occupational choice. Another literature examines the effects of the New Economic Policy regulations in Malaysia, which established equity ownership quotas for private sector firms and reportedly favored native Malays in public sector hiring. Tran (2013) finds that Malaysian firms stay inefficiently small when subject to regulation above a size threshold, while Fang and Norman (2006) show that these regulations may have actually widened the Malay and Chinese wage gap.

This study adds to this literature in several ways. First, the strict enforcement and clean color-band assignment cutoffs provide quasi-experimental variation in the intensity of regulation that allow this study to estimate the causal effect of the quota on firms. This type of evidence is rare in this literature, which must often rely on regulatory variation generated by changes in contractor status or industry mix.³

This study is also the first to examine a quota program of this magnitude, both in terms of the number of industries included in the program as well as its geographical extent. The overall effects of programs that target a particular industry or focus on a single area are likely to be small both because of the small number of affected workers as well as the fact that workers may easily be shifted from nontargeted industries or areas. Because of this, the modest effects seen in these types of programs may not be relevant when scaled up to an economy-wide program like Nitaqat. This analysis therefore offers a more accurate picture of the effects of a national-level quota policy. This paper is also the first to examine the effect of a nationalization policy rather than one targeting a historically disadvantaged minority. These differences in the characteristics of the targeted labor force will also have an effect on the interpretation of these results.

This program is of particular interest given the popularity of nationalization as an employment stimulus program in other resource-rich countries. Among these, Nitaqat is unique in its broad scope and its enforcement, and therefore provides an important test case for countries looking to expand their efforts in this area. Previous

³Miller (forthcoming) addresses potential endogeneity issues using an event study design to exploit variation in the timing of first and last federal contracts across establishments to estimate establishment-level employment effects of US federal affirmative action regulations. Kurtulus (2015) also uses within-employer changes in contractor status to estimate firm-level effects.

work on this topic has offered detailed reviews of these nationalization policies in the countries of the GCC. Randeree (2012) describes these efforts and discusses how complementary policies, such as education and training, cross-country coordination, and improving women's employment access could help spur more meaningful participation of nationals in the private sector. Using the available aggregate data on employment and wages, Hertog (2014) compares these quota-based nationalization policies with more market-based nationalization efforts and concludes that policies that directly address the wage and labor rights gaps between nationals and expatriates would likely be more effective in promoting nationalization. This study adds important evidence to the debate about the efficacy of these programs by providing empirical estimates of both the benefits in terms of the employment of nationals as well as the costs to private sector firms.

In addition to these cross-national comparisons, there are also several papers on the effects of Nitaqat in particular. Ramady (2013) carefully discusses the likely economic costs of Nitaqat to Saudi private sector firms. The paper also discusses potential interactions of Nitaqat with other proposed government labor market policies. Sadi (2013) uses a survey to assess private sector reactions to Nitaqat. The responses indicate that managers were generally positive about Nitaqat's likelihood of increasing Saudi employment, but revealed concerns that Saudis were being hired simply to meet quotas rather than for meaningful work. The empirical evidence in the current paper provides important quantitative context to these qualitative and survey-based assessments.

II. Background: Saudization and the Nitaqat Program

Like the other countries of the GCC, Saudi Arabia's economy in 2011 was characterized by a heavy dependence on oil and gas, a large number of guest workers, high (and rising) native unemployment and sluggish growth in the non-oil private sector.⁴ Saudi nationals formed about half of the labor force, with four million Saudis employed in 2011. Of these, 60 percent worked in the public sector, and only about 600,000 worked in the non-oil private sector. Foreign guest workers made up 90 percent of the non-oil private sector workforce. These expatriate workers form one of the world's largest migrant populations: in 2010 Saudi Arabia was the fourth largest destination for migrants after the United States, Russia, and Germany, with 7.3 million immigrants forming a striking 28 percent of its population (Global Bilateral Migration Database 2011). Unemployment was also very high among new labor market entrants, and official government figures reported 40 percent unemployment in the 20–25 age group in 2011.

From 1995 to 2010, Saudi Arabia's nationalization efforts had been similar to others in the region, with extremely ambitious Saudization targets that were not enforced on a broad scale but which had achieved some success in the oil and gas

⁴Labor markets in the GCC are dramatically segmented, with guest workers forming between 20 and 80 percent of the total workforce and about a third of the total population in the region. Most expatriate employment is in low-skilled occupations in the private sector, while nationals tend to work in the public sector or in the oil and gas industry.

and financial services industries. The Saudi Ministry of Labor announced plans to enact an updated nationalization policy in early 2011 to replace this old program. The new program, called *Nitaqat*, or “bands,” was designed to give firms more attainable targets and to introduce incentives to achieve nationalization quotas.

The Ministry of Labor released detailed information about the structure of the program to firms in June 2011, including specific quotas as well as the corresponding sanctions and benefits for compliance. These sanctions and benefits were phased in starting in September 2011. This section discusses some of the potential reasons for low baseline Saudization rates at private sector firms and then presents details on the construction and enforcement of the *Nitaqat* quotas.

A. Baseline Saudization Rates

Before the program began, most firms had relatively low baseline Saudization rates, with overall Saudization of 8.7 percent in the 1.1 million firms in the sample in July 2011. This was likely due to a variety of factors, including higher reservation wages for Saudis and lower employment protections for expatriates. In addition, qualified Saudi workers tended to be more difficult to hire than expatriates. This is likely the consequence of limited experience on both the supply and demand side: because of their low engagement with the private sector, Saudi workers may have been less likely to have the required skills, including related work experience and education in relevant fields. Low Saudi employment also meant that many firms had little experience recruiting Saudis, and 74 percent of firms in the baseline sample had zero Saudi workers at the start of the program. These firms had limited access to referral networks, which are likely to be important for recruiting underrepresented workers (Miller forthcoming). There can also be substantial fixed costs involved in hiring Saudi workers. Saudi women, for example, make up a large fraction of unemployed workers, particularly at higher education levels. However, Saudi law requires that women have physically separate work spaces from their male colleagues as well as separate building entrances. All together, these factors tend to make the predominantly male expatriate labor force more attractive for most firms.

Although the average Saudization rate was low, there was also quite a bit of heterogeneity in Saudi employment across industries. The share of Saudi workers is highest in industries with jobs that are considered culturally (and legally) acceptable for women and in clerical occupations where the skills are similar to those needed in the public sector. Financial institutions and petroleum and gas extraction, for example, both began with Saudization rates above 75 percent. Industries requiring manual work or specialized skills tended to have the lowest Saudization rates. These include construction, farming, maintenance, transportation, and real estate.

In addition to the substantial variation in Saudization across industries, different firms also have very different rates of Saudi employment within industry groups. This is likely due to a mixture of structural and transitory issues. Because employing Saudis requires significant fixed costs, firms that have already made these investments likely find it easier to hire Saudis. These investments may include workspace, developing effective Saudi hiring practices, human resources (HR) quality, and physical capital to accommodate workers with different types of skills.

B. Firm Categories

Under Nitaqat, the Saudization quotas that firms face vary by industry and size category. There are currently 52 different industry categories based on the 3,127 economic activities registered with the Ministry of Commerce. Since June 2011, the program has added 11 new industry classifications, increasing the number of industries from 41 to 52.⁵ Of these original 41 industries, 37 had firms subject to Nitaqat regulations in the June 2011 data. Within each category, the program sets different targets depending on firm size. The five size categories are: tiny (< 10 employees), small (10–49 employees), medium (50–499 employees), large (500–2,999 employees), and giant (3,000+ employees).

The program assigns firms to industry and size categories according to the economic activity of their branches (as registered with the Ministry of Commerce), their number of employees as calculated by the Ministry of Labor using visa information from National Information Center records, and the number of Saudi employees from the General Organization for Social Insurance (GOSI). The size group classification corresponds with the total number of employees in a single industry category across all branches of the firm. For example, a firm with three bakeries with 30 employees at each branch would be counted as a single entity with 90 employees, putting it in the medium size category. A firm with a jewelry store with 12 employees and a clothing store with 60 employees would be classified as two entities, one small entity in the jewelry sector and another medium entity in the retail sector. If the firm decided to list as one entity, it would be considered medium sized with 72 employees, and would have to achieve Saudization targets for the most stringent sector in which it had any economic activity, in this case the jewelry sector with 20 percent nationalization rather than the retail target of 17 percent nationalization. Firms may also choose to list as a conglomerate, in which case their business lines are classified as a single entity and coded in the “multiple economic activities” category. Overall, the Ministry monitors 1.8 million branches and 1.2 million private sector entities under Nitaqat.

C. Nitaqat Color Bands

Within each cell of the industry by size classification, the Ministry assigns firms to a color group based on their Saudization percentage relative to the color group cutoffs for that cell. For a medium-sized construction entity, for example, the color band ranges were:

Red:	0–2 percent
Yellow:	2–6 percent
Green:	6–28 percent
Platinum:	28+ percent

⁵The Ministry split several existing industry categories in response to complaints that the program held dissimilar business groups to the same targets. Road cargo transport, for example, was divided into long-haul and intra-city trucking. The Ministry of Commerce allowed firms to appeal their initial classification up to one time.

A construction firm with 5 Saudi employees and 95 foreign workers would therefore be classified as Yellow with a Saudization rate of 5 percent. Firms with fewer than ten employees were classified as “White” and were not included in the program.⁶

The Ministry set industry and size group cutoffs based on pre-Nitaqat Saudization rates so that slightly less than half of firms would be coded as Green or Platinum and the rest as Red or Yellow. The lower bound for the Green band was therefore set so that each cell’s median Saudization percentage would fall in the Yellow band for cells where median Saudi percentage was above zero. Cutoffs for the Red and Platinum bands were set at the discretion of Ministry staff. The program calculates a firm’s Saudization rate using a 13-week moving average of the number of Saudi workers registered with GOSI. This smooths shocks and encourages firms to improve their color band status through long-term employment of Saudis rather than through temporary positions.

D. Enforcement: Sanctions and Benefits

The main services that the Ministry of Labor provides to firms are foreign recruitment and the issuance and renewal of work visas for foreign workers. The introduction of the Nitaqat program coincided with a streamlining of Ministry visa applications in which firms could renew and change their visas online. Firms in the Green and Platinum bands were eligible for these new expedited visa services, while firms in the Yellow and Red bands faced increasing restrictions over time in their ability to renew existing visas and to recruit foreign workers. In addition to becoming eligible for expedited and more flexible visas for their foreign workers as well as enhanced recruitment services from the Ministry, firms in the Green and Platinum bands could also offer jobs to foreign workers from the Red or Yellow color band categories. Firms in the Yellow band faced some restrictions on their visa renewals, and were not eligible for the electronic visas or recruitment services. Entities in the Red band could not renew any of their existing visas and could not obtain any new visas. Their existing visas were very inflexible, and they were not allowed to open any new facilities or branches. According to the Ministry, the sanctions were designed so that firms that remained in the Red band would find it prohibitively difficult to remain in business. Table 1 summarizes the sanctions and benefits along with the timing of their implementation. All sanctions and benefits were being enforced by the end of the first year of the program.

It is important to note that the quick program implementation is likely to be a key driver of the magnitudes of some of the policy’s effects. The Ministry implemented the full sanctions for Red and Yellow firms within 25 and 38 weeks of the program’s launch, which gave firms relatively little time to adjust their staffing.⁷ It is therefore likely that the negative short-run effects of the program would have been

⁶There are some exceptions where larger companies are categorized as White in cases where Saudization was not considered feasible. International schools, for example, have no Saudi employment quotas.

⁷In practice, firms likely had the effects of these sanctions phased in more slowly after these cutoff dates as they needed to renew visas, but the change was still quite rapid.

TABLE 1—NITAQAT SANCTIONS AND BENEFITS BY COLOR BAND AND DATE

<i>Red firms</i>	
September 11, 2011	Existing visas cannot be renewed for longer than three months Job descriptions for foreign workers cannot be changed No hiring of expatriate workers from other firms No new visas issued Firms cannot open any new facilities or branches
November 27, 2011	Existing work visas can no longer be renewed Expatriate employees may freely transfer their employment to Green or Platinum band companies without the consent of their current employer
<i>Yellow firms</i>	
September 11, 2011	Existing visas cannot be renewed for longer than three months Job descriptions for foreign workers cannot be changed No hiring of expatriate workers from other firms No applications for new temporary or seasonal visas accepted Firms are entitled to one new visa for every two workers departing the country on a final exit visa
February 24, 2012	Existing work visas can no longer be renewed Workers who have been in the Kingdom for more than six years cannot renew their visas Expatriate employees may freely transfer their employment to Green or Platinum band companies without the consent of their current employer
<i>Green firms</i>	
September 11, 2012	Visa applications can be submitted as usual Job descriptions for foreign workers can be updated as necessary Firms are entitled to one new visa for every two workers departing the country on a final exit visa Firms receive a six-month extension for the submission of the Certificate of Zakat and Income Tax
November 27, 2011	Expatriate workers may be hired from Red firms
February 24, 2012	Expatriate workers may be hired from Yellow firms
<i>Platinum firms</i>	
September 11, 2012	Unrestricted approval of new visas Job descriptions for foreign workers can be updated as necessary Firms are entitled to one new visa for every two workers departing the country on a final exit visa Firms receive a six-month extension for the submission of the Certificate of Zakat and Income Tax
November 27, 2011	Expatriate workers may be hired from Red firms Firms receive a one-year extension for the submission of all MOL documents
February 24, 2012	Expatriate workers may be hired from Yellow firms Existing visas may be renewed for any employee with less than three months remaining on their visa

Source: List compiled from <http://www.emol.gov.sa/nitaqat/pages/ServiceExtrs.aspx> and the Ministry of Labor Nitaqat Manual.

more muted if the program had implemented sanctions more slowly. The estimated effects are therefore a combination of the quotas themselves as well as the details of the program's implementation, including both the timing as well as the types of compliance incentives.

E. Program Results

Between July 2011 and October 2012, the number of Saudis employed in the private sector increased by 462,000, and the Ministry has claimed that the program was

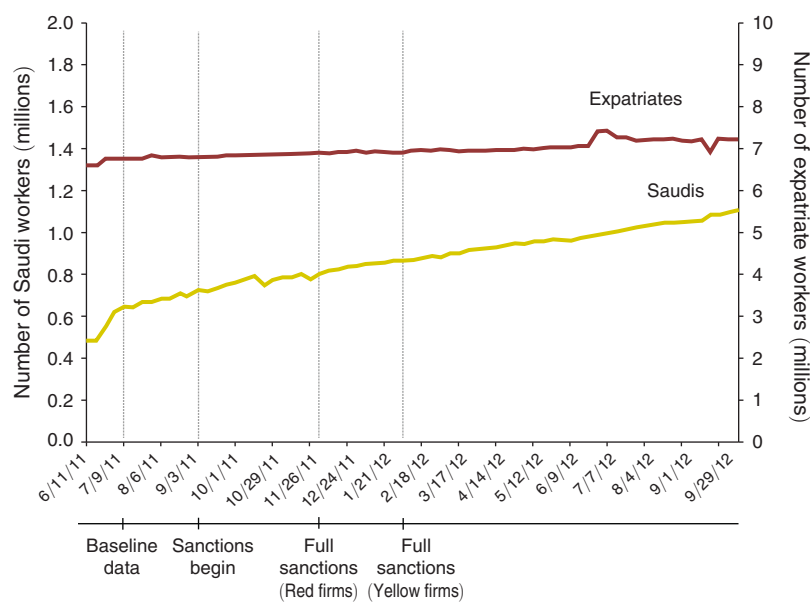


FIGURE 1. WEEKLY TOTALS OF SAUDI AND EXPATRIATE PRIVATE-SECTOR EMPLOYEES

Notes: This figure shows the weekly totals of Saudis and expatriate workers in the Nitaqat data. Vertical lines indicate important dates in program enforcement.

responsible for the creation of 250,000 jobs for Saudi nationals in its first year (Arab News 2012a). Figure 1 shows the time series of Saudi and expatriate workers in the private sector. While the number of expatriates in the sector increased by almost the same amount (467,000), the Saudi workforce grew by 72 percent, while the expatriate workforce increased by only 7 percent. There was also a large improvement in firm color-band assignments, with most Red and Yellow firms moving into the Green or Platinum bands by October 2012. Table 2 shows the matrix of firm color band movements, depicted graphically in Figure 2. Approximately 50 percent of Red firms improved their status, ending the period in the Yellow, Green, or Platinum bands. Approximately 70 percent of Yellow firms improved their status, and relatively few Green and Platinum firms (4.4 and 17 percent, respectively) moved into the Red and Yellow color bands. Table 2 also shows that the number of employees at firms in each color band reflects these changes in firm Nitaqat status, with substantial increases in the number of workers in Green and Platinum firms at endline and large drops in the numbers of employees at Yellow and Red firms.

As expected, the reaction from Green and Platinum firms has been quite positive: an HR representative from a telecommunications company categorized as Green under Nitaqat reported that visa applications are now much quicker and that work visas are easier to obtain. Representatives from companies categorized as Yellow and Red complained about the prohibitive cost of recruiting and hiring Saudis and the negative effects of visa restrictions driving their business to other GCC countries. A recent article also reports that investors in the Saudi trucking industry complain that Nitaqat has hurt their business, claiming that the restrictions cause them

TABLE 2—FIRM MOVEMENTS AND TOTAL EMPLOYEES BY COLOR BAND (July 2011 to October 2012)

July 2011	October 2012 Color Band						
Band	White	Red	Yellow	Green	Platinum	Exit	Total
<i>Panel A. Number of firms</i>							
White	981,359	0	0	0	0	45,750	1,027,109
Red	20	19,154	7,334	32,521	1,421	27,523	87,973
Yellow	0	570	1,013	5,595	166	2,691	10,035
Green	1	996	1,411	11,260	718	2,765	17,151
Platinum	0	33	43	483	829	326	1,714
Total	981,288	20,753	9,801	49,859	3,134	79,055	1,143,982
<i>Panel B. Percentage of starting firms</i>							
White	95.5	0	0	0	0	4.5	
Red	0	21.8	8.3	37.0	1.6	31.3	
Yellow	0	5.7	10.1	55.8	1.7	26.8	
Green	0	5.8	8.2	65.7	4.2	16.1	
Platinum	0	1.9	2.5	28.2	48.4	19.0	
<i>Panel C. Number of employees</i>							
	White	Red	Yellow	Green	Platinum	Total	
July 2011	1,780,937	3,413,346	989,088	1,069,860	159,896	7,413,127	
October 2012	1,963,558	729,006	622,443	4,472,792	555,880	8,343,679	
Percent change	+10.3	−78.6	−37.1	+318.1	+247.7	+12.6	

Notes: Panel A displays the number of firms that moved between color bands between July 2011 and October 2012. Rows indicate the starting color band of the firm and columns indicate the ending color band. Panel B gives the share of firms in each starting color band that moved to each of the ending color bands. This sample includes only firms that were in the baseline sample (July 2011). Panel C shows the total number of workers employed at firms in each color band in July 2011 and October 2012. The sample includes employees at all firms that were in the sample in either period.

to lose SR 250 million a year for failing to hire enough Saudi truck drivers to meet their 10 percent benchmark (Arab News 2012b).

III. Data

The primary data for this analysis are the administrative Nitaqat program data collected by the Ministry of Labor. This dataset contains weekly entity-level observations of the employment measures and corresponding color band assignments used by the Ministry to determine program compliance and trigger enforcement measures.⁸ The dataset contains firm characteristics including geographic location, industry, size category, and a unique firm identifier. Collected employment measures include counts of Saudi and expatriate employees, as well as counts of employees in important groups such as disabled Saudis, former prisoners, citizens of other GCC countries, non-Saudi spouses of Saudi citizens, non-Saudis with Saudi mothers (“special foreigners”), part-time workers, students, and members of displaced tribes from the Rub’ al Khali with a Saudi passport but no national identity card. For Nitaqat purposes, the Ministry counts non-Saudis with Saudi spouses or Saudi mothers and members of displaced tribes toward the total Saudi employee count.

⁸ Although the program monitored compliance using administrative records, there is of course no guarantee that registered workers were employed in meaningful work. There are reports that some firms elected to pay locals a minimum wage simply to register their national ID number with the company (Sadi 2013).

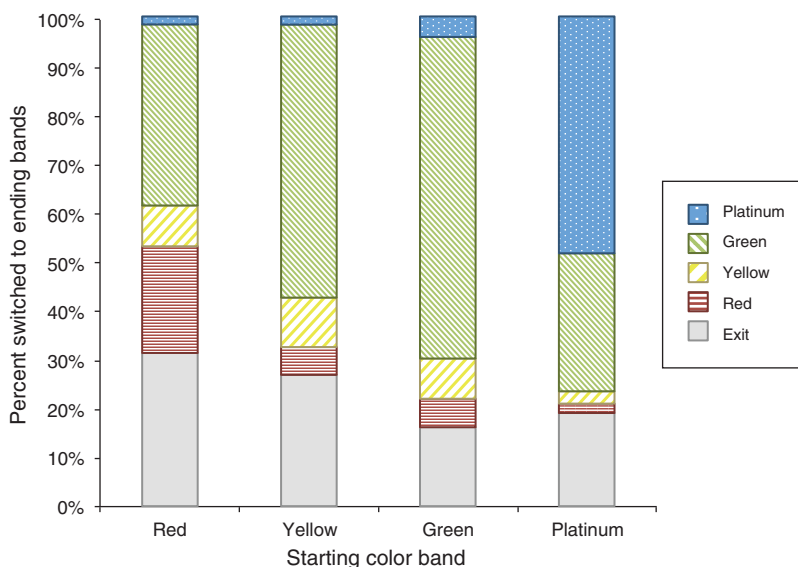


FIGURE 2. MOVEMENTS BETWEEN COLOR BANDS (July 2011 to October 2012)

Notes: This figure shows the proportion of firms in each starting category (x-axis) that transitioned into different color bands. For example, most firms in the Yellow starting color band moved to the Green category, and less than 10 percent moved into the Red category by October of the following year.

Former prisoners are counted as two Saudi employees, disabled Saudis as four Saudi employees, and students working part-time as half of a full-time Saudi worker.⁹ The total number of Saudi workers for Nitaqat Saudization calculations is therefore:

$$\begin{aligned}
 \text{Nitaqat Saudis} = & \text{Saudis} + \text{Spouses} + \text{Special Foreigners} + \text{Gulf Citizens} \\
 & + \text{Displaced Tribes} + 4 \cdot \text{Disabled Workers} + 0.5 \cdot \text{Students} \\
 & + 2 \cdot \text{Former Prisoners} + 0.5 \cdot \text{Part-Time Workers}.
 \end{aligned}$$

The Nitaqat Saudization rate is the ratio between this total and the total number of employees. The Ministry updates all of these employment measures on a weekly basis using data on visa issuance for foreign workers and GOSI data on Saudi employment rolls. Data collection began on June 11, 2011, and entities were fully represented and reporting all employees by July 9, 2011. Therefore, although data exists for June, all comparisons in this paper are based on a starting date of July 9, 2011. The dataset contains observations through October 13, 2012.

The dataset includes observations for over one million firms, 116,873 of which were large enough to be included in the Nitaqat program at its start in July 2011. Of these, 83,568 also appear in the data for October 2012, reflecting exit by 33,305

⁹The Nitaqat bonus for former prisoners and disabled workers applies to up to four employees in each group; subsequent employees in these groups count as one additional employee for Nitaqat purposes.

from the sample.¹⁰ Over the intervening 16 months, 45,685 new firms entered. The estimates use the full set of 116,873 baseline firms, with all employment figures set to zero in October 2012 for exiting firms. The matched sample of 83,568 firms is used to examine changes in Saudization percentage at surviving firms. These firms are distributed across 37 industries and four size categories at baseline (online Appendix Table A.1), and appear in 109 of the corresponding industry-by-size categories. Just over one-third of these entities were in the construction industry, with most of these in the smallest size category. Construction firms were also responsible for nearly half of private sector employment and almost a quarter of Saudi private sector employment (online Appendix Table A.2). In addition to being the largest private sector industry, construction also had one of the lowest Saudization rates, with an industry average of 5.8 percent Saudi workers. After construction, the next largest industries were retail and manufacturing, with 20 percent and 11 percent of the Saudi private sector workforce, respectively. The industry category for conglomerates (“multiple economic activities”) contains a large number of entities, all of which have less than 50 employees and employ less than 1 percent of the Saudi private sector workforce. Although a large number of firms were exempt from Nitaqat over the study period due to the ten employee inclusion cutoff, the firms included in the program employed over 95 percent of the Saudis and 68 percent of the expatriates in the private sector workforce at baseline.

Also of note is the large variation in Saudization rates across industries and within different size groups. In July 2011, Saudis made up less than 5 percent of the workforce in farming, maintenance, and private labor recruitment services. Financial institutions had the highest starting Saudization rate at 80 percent, petroleum and gas followed at 76 percent, and petrochemicals at 45 percent. Though the total workforce share of firms was roughly declining in firm size, Saudi employment was greater for larger firms (online Appendix Table A.3). Tiny firms accounted for only 3 percent of Saudi employment, small firms for 12 percent, medium firms for 29 percent, and large firms for 37 percent. The 58 giant firms with over 3,000 employees employed 11 percent of the total workforce and 19 percent of the Saudi workforce. Correspondingly, Saudization rates are higher for larger firms: small firms were only 4 percent Saudi, with less than one Saudi employee per firm in this category on average, and large firms had the highest average Saudization rate of 17 percent.

IV. Empirical Strategy

The purpose of the empirical analysis is to identify the causal effects of imposing the Saudization quotas on firms. This includes how the required increases in Saudization affected actual changes in Saudization (did the program have any effect?), the hiring of Saudis and downsizing of expatriates (how did firms achieve

¹⁰ It should be noted that exit from the Nitaqat sample does not necessarily reflect exit from the market, and these exit rates may overestimate overall rates of firm shutdown. Entities may exit the sample by falling below the ten employee inclusion threshold or by creating a new registration with the Ministry of Labor following a merger, split, or other change in firm structure. Section VD examines the distribution of firms by size at baseline and endline and finds no evidence of bunching below the inclusion cutoff.

their Saudization targets?), and firm size and exit (what costs did these requirements impose on firms?).

The policy variable of interest is therefore the compliance requirement that the Nitaqat program imposed on firms, i.e., the amount by which firms were required to increase their Saudization rates or hire/downsize to meet their quotas. If these required changes were randomly assigned, the analysis could directly estimate the effect of these requirements on these outcome variables. In this case, however, the policy variable was mechanically determined by the firm's baseline Saudization percentage and the quota for the corresponding industry by size cell. These baseline Saudization rates are potentially endogenous to all of the outcomes of interest; unobserved determinants of baseline Saudization are almost certainly correlated with future changes in the employment of Saudis and expatriates as well as other measures of firm performance. Because of this, I use the variation in the compliance requirement generated by the placement of the quotas to identify the causal effects of the program on firms. In particular, the estimation relies on the variation in the incentive to increase Saudization rates created by the quota cutoffs. The Yellow/Green color band cutoffs in particular generated an incentive for firms below the quota (in the Yellow or Red bands) to increase their Saudization rates while imposing no new constraints on Green and Platinum firms with Saudization rates above the cutoff. These quotas generate a kinked assignment function from baseline Saudization percentages to the increase required for program compliance. Because of this, the main analysis uses an RKD to estimate the effects of the program on staffing, firm value, size, and exit. I also estimate overall program effects using a differences-in-differences approach comparing the relative changes of Yellow, Red, and Green firms within industry and size cells.

A. Regression Kink Design

I use a sharp regression kink design to identify the causal effects of the kinked compliance requirement generated by the quota on hiring, firm size, and exit around the quota cutoffs. The methodology is formalized by Card et al. (2012), which establishes the conditions under which the RKD identifies the local average response, or treatment on the treated, parameter that would be identified if the treatment had been randomly assigned. The necessary identification tests and robustness checks are similar to those for RDD outlined in detail in Lee and Lemieux (2010).

The RKD analysis focuses on the Yellow/Green cutoff in the main RKD results for two reasons. First, this was the most important cutoff in terms of determining the types of sanctions and benefits. The main difference between Red and Yellow firms was in the timing of the sanctions: the sanctions themselves were effectively the same for both within eight months of the program's start. Platinum firms received additional benefits in terms of the ease of visa renewal, but these are relatively minor relative to the lifting of visa sanctions at the Yellow/Green cutoff. Second, the Yellow/Green cutoffs were set to be close to the median Saudization rates for firms in these cells, so the main density of firms was clustered around this cutoff. While there were also many firms near the Red/Yellow cutoffs, the Yellow/Green cutoffs were usually quite close: the average gap between the two was 4 percentage

points. The Green/Platinum cutoffs were substantially higher: the average jump from the Yellow/Green to Green/Platinum cutoff was 23 percentage points and the median Green/Platinum cutoff was 30 percent. The main RKD analysis therefore focuses on the Yellow/Green cutoff, but graphical results are presented for the Red/Yellow and Green/Platinum cutoffs as well in online Appendix Figure A.1.

Compliance Requirement.—The RKD analysis in this paper relies on the kinked compliance requirement generated by the imposition of Saudization quotas on firms in each industry-by-size group. As discussed above, the primary analysis focuses on the quota at the Yellow/Green cutoff. Yellow and Red firms had to increase Saudization rates by an amount equal to their starting distance below the cutoff to comply with the program. For Green and Platinum firms above the cutoff, I assume that firms already in compliance (with baseline Saudization rates just above the quota) experienced no incentive to change their Saudization rates as a result of the program. This generates a kinked function mapping initial Saudi percentage to the increase mandated by the program. We can combine the compliance requirement for each cell by normalizing the cutoff to zero and measuring the compliance requirement as the distance below the cutoff, i.e.,

$$b(V_{ijs}) = \max(Q_{js} - S_{ijs}, 0),$$

where S_{ijs} is the initial Saudization percentage for firm i and Q_{js} is the quota for the corresponding industry j and size group s , and V_{ijs} indicates the corresponding baseline quota distance. This normalization yields a rule with a single kink at zero, with a slope of one below the cutoff and zero above.¹¹

When examining the effect of the program on variables measured in terms of employees, i.e., number of Saudi employees and number of expatriate employees, it is useful to define the distance from the cutoff in terms of the number of Saudis that would have to be hired or expatriates that would have to be downsized to meet the quota.

For Saudis, we can express this as

$$Distance_{ijs}^S = Saudis_{ijs}^* - Saudis_{ijs},$$

where $Saudis_{ijs}^*$ is the number of Saudis necessary to meet the relevant quota without changing the baseline number of expatriates.

Similarly, for expatriates:

$$Distance_{ijs}^E = Expats_{ijs}^* - Expats_{ijs},$$

where $Expats_{ijs}^*$ is the number of expatriates necessary to meet the relevant quota without changing the baseline number of expatriates.

¹¹ This normalization pools firms facing different quota cutoffs into a single sample. This approach is standard in the RD literature when cutoffs vary by treatment site or year (see for example Black, Galdo, and Smith 2007), and yields an estimate of the weighted average effect over cells.

These normalizations are useful in interpreting the effects of the program in terms of the number of different types of workers employed, and I use this scaling for the RKDs on changes in Saudi and expatriate staffing. This puts the axes in the same units (e.g., number of Saudis hired versus number of Saudis needed to meet the quota) and groups together firms facing the same requirement in terms of changes to the number of Saudi employees. In cases where the outcome of interest is not interpretable in terms of number of employees (exit rates, percent change in size, Saudization percentage), I use the percentage point quota distance as a measure of the intensity of the program. This captures the intensity of the compliance requirement without specifying the compliance channel as Saudi hiring or expatriate downsizing.

The assumption that Green and Platinum firms have a compliance requirement of zero is consistent with the idea that baseline Saudization rates reflect unobserved differences in propensity to hire Saudis, whether because of fixed investments made in Saudi HR development, physical capital, or employee-driven recruitment networks. If this propensity to hire Saudis generates an optimal number of Saudi workers that is not affected by the presence of nonbinding quotas, then we would not expect these firms to change their staffing in response to Nitaqat regulations.¹² However, this assumption will be violated if firms above the quota experienced pressure to change their Saudi percentages. This may be the case if quotas affected equilibrium wages or resulted in other spillovers from treated (Yellow and Red) to non-treated (Green and Platinum) firms. In this case, firms above the quota would have incentives to move down to the quota, implying a compliance requirement with a smaller kink than the one described above. If the compliance requirement was in fact entirely smooth, then the RKD would find no program effect even if the program in fact had a large effect on firms. This effect may be mitigated by the incentive of these firms to maintain their Nitaqat compliance by replacing these workers. The results, however, indicate that firms just above the quota tended not to adjust their Saudi employment in response to Nitaqat requirements.

RKD Identification and Estimation.—Identification in the RKD relies on two key assumptions. First, the marginal effect of quota distance on the outcome variables must be smooth. Second, the density of the outcomes with respect to any observed heterogeneity should be twice continuously differentiable around the quota cutoff. If everything else is smooth near the kink, any changes in the slope of the outcome can be attributed to the kink in the compliance requirement.¹³ In this case, the RKD will identify the desired “treatment on the treated” parameter at this point, i.e., the average effect of a marginal increase in the compliance requirement near the cutoff holding the distribution of unobservables constant. The degree to which quota distance is correlated with the error term will determine the extent to which this treatment effect applies to firms that are farther away from the quota.

¹²If variation in baseline Saudization rates is driven by random fluctuations around the median (where the quotas were set), then we would expect Green and Platinum firms to tend to revert to the mean, decreasing their Saudization rates independently of the program.

¹³In our case the kink is sharp: the compliance requirement is a deterministic function of baseline Saudization percentage.

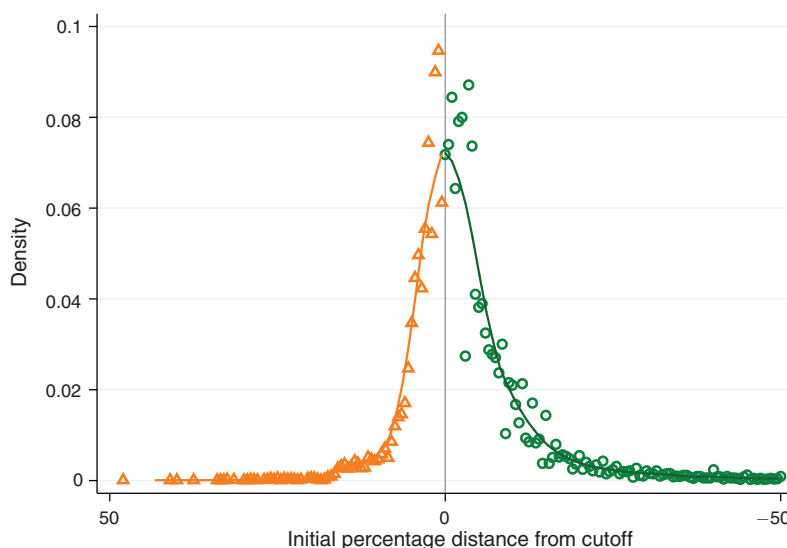


FIGURE 3. DENSITY OF BASELINE SAUDIZATION PERCENTAGES RELATIVE TO CUTOFF

Notes: Firms with zero Saudization percentage at baseline are excluded from this figure. Bin size is 0.5 percentage point. This figure corresponds to a McCrary test for a break in the baseline Saudization percentage for Green firms (circles) and Yellow firms (triangles) at the compliance cutoff. The corresponding McCrary test statistic is 0.94.

The first identification assumption rules out precise manipulation of baseline Saudization percentage by firms near the quota cutoffs. This is reasonable given that the quotas were not announced prior to the start of the program: although firms had been informed that the government would start enforcing Saudization quotas, firms were not told where the cutoffs would be for their industry and size groups until the start of the program in June 2011. We can test for this by examining the baseline distribution of quota distance V . In particular, I use a modified McCrary test to test for a break in the density of V around the kink in the compliance function (McCrary 2008). Figure 3 plots the density of baseline Saudization percentages relative to the cutoff. The test shows no evidence of bunching to the right of the quota at the start of the program, and the figure confirms that quotas were set near the median starting Saudization percentages.

Another concern is that firms may have reacted to the announcement of Nitaqat by downsizing below the different size cutoffs before the baseline data was collected. This is a particular concern about the inclusion cutoff at ten employees but is also relevant at the different size bin cutoffs, as quota stringency was increasing in firm size group. Figure 4 plots the number of firms by baseline employee count relative to the cutoffs for small, medium, and large firms. There is no evidence that firms bunched below the ten-employee inclusion cutoff at baseline, and if anything there is a slight increase in the number of firms reporting exactly ten employees at baseline. There is similarly no evidence of firms bunching below the 50 and 500-employee cutoffs for assignment to the medium and large size bins.

The second identification assumption implies that there should be no kinks in baseline covariates around the quota. This is analogous to a test for true random

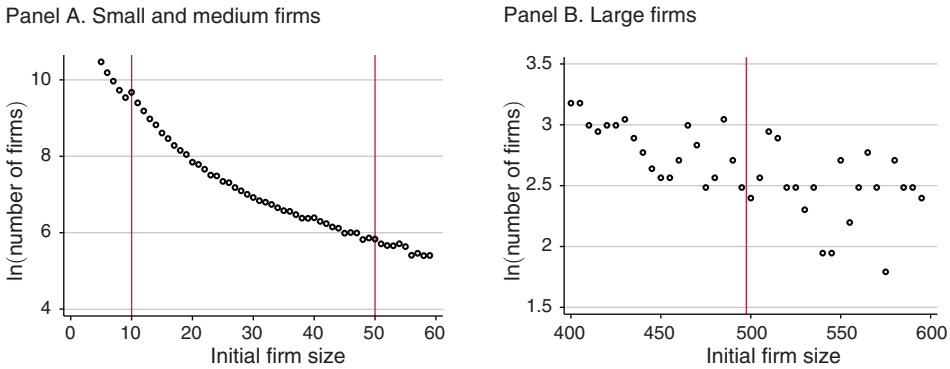


FIGURE 4. BASELINE FIRM SIZE RELATIVE TO SIZE BIN CUTOFFS

Notes: This figure shows the log of the number of firms by firm size in one-employee bins (panel A) and in five-employee bins (panel B). Vertical lines indicate size bin cutoffs at 10, 50, and 500 employees. McCrary tests reject the null of bunching to the left of these cutoffs.

assignment in an RCT. Baseline values of several sample covariates (firm size, Saudi employees, and expatriate employees) are plotted in Figure 5; none of these correspond to a statistically significant kink around the cutoff. The fact that quotas were assigned near cell medians also means that there should be roughly the same number of firms above and below the cutoff within industry by size groups.

Under these conditions, the RKD estimate is the change in the slope of the conditional expectation function for outcome Y , $E[Y|V = v]$, at the kink point $v = 0$ divided by the change in the slope of the assignment function $b(\cdot)$ at that same point. In our case, the assignment function is $b(V) = \max(V, 0)$, so the change in the slope of the assignment function is 1 at the cutoff. We therefore have

$$\tau = \lim_{v \rightarrow 0+} \frac{\partial E[Y|V = v]}{\partial v} - \lim_{v \rightarrow 0-} \frac{\partial E[Y|V = v]}{\partial v} = \hat{\beta}_1,$$

where $\hat{\beta}_1$ is estimated from the model:

$$E[Y|V = v] = \sum_{p=0}^P [\alpha_p v^p + \beta_p v^p \cdot D],$$

where $|v| < h$ for bandwidth h , and P is the polynomial order of the fit. I estimate these local polynomial regressions using a symmetric uniform kernel and several estimation and bandwidth selection methods.

The primary specifications use a quadratic polynomial and the bandwidth selector and biased-corrected estimator proposed by Calonico, Cattaneo, and Titiunik (2014b) (CCT) and implemented using Calonico, Cattaneo, and Titiunik (2014a). This procedure adjusts the local RKD estimate using a bias correction method using a local regression of order $p + 1$. The bandwidth for the bias-correction term (b) is selected optimally by the CCT bandwidth-selection routine. I use this routine for calculating robust confidence intervals for these estimates using the fixed-matches

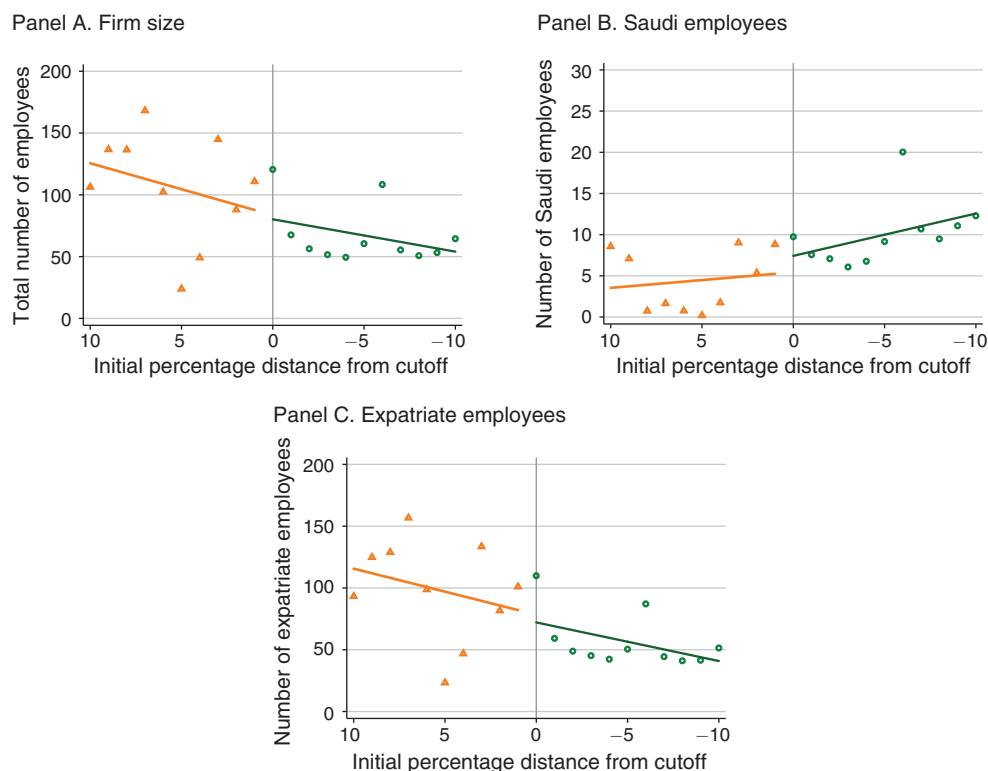


FIGURE 5. BASELINE EMPLOYMENT RELATIVE TO INITIAL DISTANCE FROM THE CUTOFF

Notes: Parametric tests for a kink in these baseline employment figures fail to reject the null of no change in the slope at all conventional significance levels. The corresponding RKD estimates from the Calonico, Cattaneo, and Titiunik (2014b) (CCT) estimator with uniform kernel and CCT optimal bandwidth are:

	CCT Bandwidth (h, b)	Kink	p-value
A. Firm size	(9.05, 21.88)	-1.22	0.78
B. Saudi employees	(7.31, 15.02)	-0.15	0.81
C. Expatriate employees	(9.41, 21.93)	-1.21	0.75

estimated residuals. I include results from the conventional nonparametric RKD estimator for comparison. I also report results for the “rule-of-thumb” (ROT) bandwidth selector described in Fan and Gijbels (1996) for a local linear and a local quadratic conventional specification as a robustness check.¹⁴

B. Differences-in-Differences

While the RKD analysis focuses on changes in incentives to hire around the kink in the policy rule, I also estimate the overall effects of the Nitaqat program on Saudi employment, expatriate employment, firm size, and exit. I do so using a differences-in-differences analysis based on firms assigned to the Red or Yellow

¹⁴The conventional local linear regression with the ROT bandwidth selector is the preferred specification in Card et al. (2015).

color bands, as compared to firms in the Green band within the same industry-by-size cell. Therefore, the estimating equation is

$$\Delta Y_{ijs} = \gamma_1 \cdot \text{Red}_{ijs} + \gamma_2 \cdot \text{Yellow}_{ijs} + \alpha_{js} + \epsilon_{ijs},$$

where i indicates the firm and j and s the industry and size groups. ΔY indicates the change in the outcome variable between July 9, 2011 and October 13, 2012 and *Red* and *Yellow* are dummy variables indicating color band at baseline. Fixed effects α_{js} are included to control for cell-level changes in the outcomes. In the differences-in-differences analysis, change in Saudization percentage is calculated only for firms in the matched sample, while percent changes in employee counts (Saudis, expatriates, and total) are based on all firms in the baseline data. I assign employment values of zero in the October data to firms that exit before October 2012.

This method requires more assumptions about the effects of Nitaqat on firms above the cutoff than the RKD. In particular, the quality of these estimates will depend on the assumption that firms just above the quota cutoff provide a good counterfactual for firms below and farther above the cutoffs. If baseline Saudization rates are the results of different Saudi hiring propensities related to firm characteristics (including fixed hiring investments), Green firms as a whole will tend to be a less useful comparison group than those just above the quota. Spillover effects on Green firms will also bias the results. For example, these estimates will be too small if Green firms just above the cutoff took additional steps to retain or hire Saudi workers because of the presence of the quota.¹⁵ The estimates will tend to be too large if Yellow and Red firms met their quotas by poaching employees from Green and Platinum firms. We may also be concerned about other types of market-level spillovers, such as wage effects, competitive effects on exits, or price effects in goods markets. Even with these caveats, it is nonetheless helpful to get a sense of the magnitude of the overall effects.

In terms of Saudi hiring, Green firms appear to be a good counterfactual for Yellow firms and a reasonable one for Red firms. Although the Nitaqat data only start at the beginning of the program, the Saudi employment data are available from GOSI starting earlier. Figure 6 shows the percentage changes in average Saudi employment at Green, Yellow, and Red firms from 2009 to 2013.¹⁶ The figure confirms that growth in Saudi employment at Yellow and Green firms was very similar before the program started, with slightly lower growth occurring at firms that would be placed in the Red band. The trend in Saudi employment growth at Green firms also appears not to change in June 2011, while Yellow and Red firms showed a rapid increase in Saudi employment growth at the start of the program.¹⁷

¹⁵ The RKD results show that these firms kept their Saudi hiring constant, which is somewhat reassuring.

¹⁶ Firm status is based on color band assignment in June 2011. Firm identifiers are coarser in the released GOSI dataset, so GOSI firms are categorized based on the “worst” color band assignment among their constituent Nitaqat entities.

¹⁷ Unfortunately, the same series was not available for expatriate workers, so it was not possible to perform the same exercise for expatriate employment and Saudization percentage. Color band assignment is dependent on firms existing in June 2011, so a retrospective analysis of exit rates was also not possible.

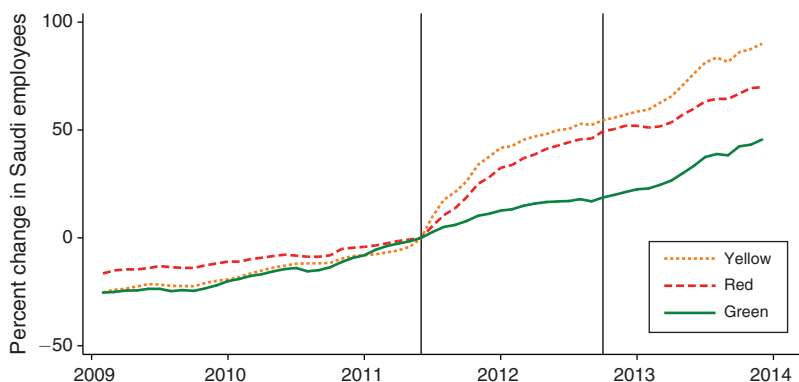


FIGURE 6. PERCENT CHANGE IN SAUDI EMPLOYEES RELATIVE TO BASELINE

Notes: This figure shows the percent changes in the average number of Saudi employees per firm in each color band relative to July 2011. Vertical lines indicate the baseline and endline dates for the analysis. The data from these series comes from worker level GOSI records.

To account for the effects of Nitaqat on the workforce composition of new entrants, I also estimate how firms that entered after Nitaqat began to compare with firms that entered in the first month of the data. In particular, the sample of 40,620 firms that entered between July 31, 2011 and October 13, 2012 is compared with the 5,065 firms that entered in July 2011 in the same industry-by-size groups. For Saudization percentage, Saudi employees, expatriate employees, and total employees, the specification is

$$Y_{ijs} = \delta \cdot PostEntrant_{ijs} + \alpha_{js} + \epsilon_{ijs},$$

where *PostEntrant* is a dummy variable equal to one for firms that entered between July 31, 2011 and October 13, 2012 and zero for firms that entered in July 2011, and *Y* is the outcome variable at endline. Of course, the quality of these estimates depends on the relevance of the July 2011 entrants as a comparison group for July 2011–October 2012 entrants in October 2012. Nitaqat may have also affected the number of new entrants in addition to the composition of those entrants. Unfortunately, it is not possible to estimate the effect on entry rates due to the limited time horizon of the program data. The estimates of the effects on Saudi employment therefore assume that the number of entrants was not affected but that their composition may have changed.

V. Results

A. Quota Compliance

Firms could achieve the required increases in Saudization percentage both by downsizing expatriates and by hiring Saudis. Figure 7 panels A and B show the RKD results for the Saudi and expatriate employment outcomes for the full set of firms in the baseline sample. There is a clear kink in the number of Saudi hires as a

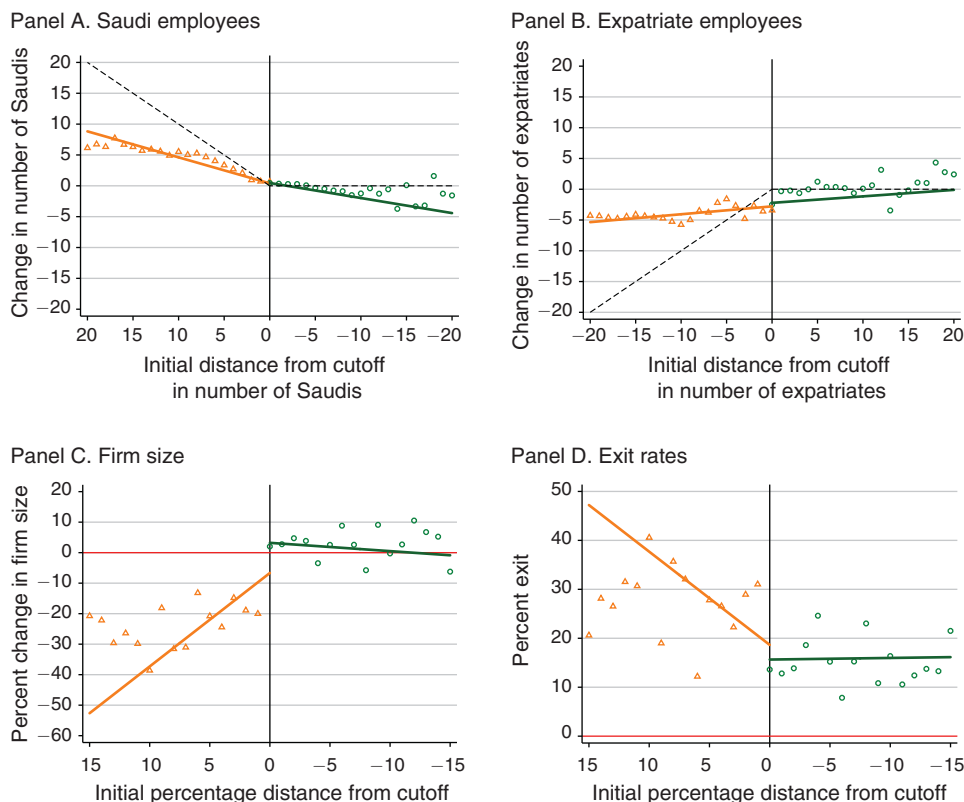


FIGURE 7. RKD FIGURES: FULL SAMPLE

Notes: This figure shows the graphical RKD results for the full sample of baseline firms. Circles (for Green and Platinum firms) and triangles (for Red and Yellow firms) plot the average outcome variable for firms in one-unit bins based on initial distance from the cutoff. The solid lines indicate predicted values from linear regressions on either side of the cutoff. Formal estimates of the kinks are given in Table 3. Dashed lines for Saudi and expatriate employees show full-compliance benchmarks. Firms that exit over the period are coded as losing all of their Saudi and expatriate employees, for a 100 percent reduction in size.

function of the firm's initial distance from the quota in terms of Saudi employees: Yellow and Red firms close to the cutoff hired almost exactly as many Saudis as they needed to reach their Saudization quotas without changing their expatriate worker totals. In contrast, Green firms just to the right of the cutoff experienced no change in their number of Saudi employees. The econometric results in Table 3 confirm this, with firms near the cutoff hiring 0.24 Saudi workers for each one needed to meet the quota. This estimate is fairly robust to the choice of specification (Table 4), and estimates range from 0.23 to 0.43 depending on the estimator, bandwidth, and polynomial order. The effects of the quota on Saudi hiring are also clearly visible at the Red/Yellow cutoff, as seen in online Appendix Figure A.1a.¹⁸

Expatriate employment, on the other hand, seems to show less responsiveness to quota cutoffs in Figure 7, panel B, though expatriate hiring increases in distance above

¹⁸ Robustness checks for alternative choices of bandwidth, polynomial, and estimation routine are presented in online Appendix Table A.4.

TABLE 3—RKD ESTIMATES: MAIN RESULTS

Outcome	CCT bandwidth (h, b)	Bias-corrected		Conventional	
		Kink	<i>p</i> -value	Kink	<i>p</i> -value
Saudi employees	(10.00, 25.00)	0.24	0.02	0.23	0.02
Expatriate employees	(27.00, 60.00)	−0.03	0.65	−0.01	0.92
Firm size	(5.33, 10.49)	−12.27	0.00	−10.48	0.00
Exit rate	(3.05, 8.64)	22.16	0.00	20.03	0.00

Notes: This table gives the main results for the RKD estimates on the full set of firms in the data in July 2011. The procedure uses the (CCT) bandwidth selector with a quadratic polynomial and the table reports kink estimates and *p*-values for the bias-corrected CCT estimator with robust standard errors and the conventional RKD estimator. For Saudi employees, the running variable is distance from the cutoff in terms of number of Saudis. For expatriate employees, the running variable is distance from the cutoff in terms of number of expatriate workers. For firm size and exit, the running variable is Saudization percentage point distance from the cutoff. The number of employees in all categories is set to zero for firms that exit the market between July 2011 and October 2012. Bandwidth is based on the units of the running variable. The largest and smallest 1 percent outliers in outcome variables are Windsorized for the Saudi and expatriate regressions and the largest 1 percent increases for the firm size regressions.

TABLE 4—RKD ESTIMATES: ROBUSTNESS CHECKS

Outcome	ROT bandwidth (h, b)	Local linear		Local quadratic	
		Kink	<i>p</i> -value	Kink	<i>p</i> -value
Saudi employees	(50.36)	0.27	0.00	0.43	0.00
Expatriate employees	(91.68)	−0.14	0.00	0.17	0.00
Firm size	(1.60)	−14.47	0.00	−71.56	0.00
Exit rate	(1.98)	6.98	0.00	52.18	0.00

Notes: This table provides robustness checks for alternative specifications to those with results reported in Table 3. The sample includes the full set of firms present in the data in July 2011. The table reports the kink estimates and *p*-values using the rule-of-thumb (ROT) bandwidth selector and the conventional (CCT) estimator. Estimates are reported for both the local linear and quadratic polynomials. For Saudi employees, the running variable is distance from the cutoff in terms of number of Saudis. For expatriate employees, the running variable is distance from the cutoff in terms of number of expatriate workers. For firm size and exit, the running variable is Saudization percentage point distance from the cutoff. The number of employees in all categories is set to zero for firms that exit the market between July 2011 and October 2012. Bandwidth is based on the units of the running variable. The largest and smallest 1 percent outliers in outcome variables are Windsorized for the Saudi and expatriate regressions and the largest 1 percent increases for the firm size regressions.

the quota. The visa restrictions placed on Yellow and Red firms (and the streamlined renewals offered to Green firms) likely reduced expatriate hiring at Yellow and Red firms, while encouraging an increase in hiring at Green firms. Yellow and Red firms far below the cutoff were the least likely to improve their color band assignment and become eligible for the enhanced recruitment services. Similarly, Green firms well-above the cutoff were both unconstrained by quotas and likely to maintain access to visa services over the period. This is confirmed in the main specification, which yields small and statistically insignificant point estimates for the effect of the quota cutoff on expatriate hiring. The estimates are sensitive to the polynomial order choice at the large ROT bandwidth choice in Table 4. While there is similarly no indication of compliance through expatriate downsizing at the other color band cutoffs (online Appendix Figures A.1c and A.1d), there is some evidence that firms in the Platinum band reacted to visa benefits by increasing their expatriate workforce.¹⁹

¹⁹ See online Appendix B for sector and industry-level RKD results.

B. Program Costs

On the cost side, the Nitaqat program also significantly increased firm exit. Figure 7, panel D, shows the graphical results, plotting average exit rate against percentage point distance from the cutoff. Unlike in the analysis for Saudi and expatriate hiring, I use the percentage point quota distance here to capture the intensity of the policy requirement. Firms above the cutoff experienced little effect on exit rate, with the average exit rate for Green firms at around 15–20 percent regardless of cutoff distance.²⁰ Exit rates for Yellow and Red firms are increasing in distance below the cutoff: each baseline percentage point below the cutoff is associated with a 22 percent increase in exit rates. These estimates are also positive for the alternative specifications in Table 4.²¹ There is some evidence that these high exit rates were driven by firms that started with no Saudi employees.

Figure 8, panels A and B, compares the RKD plot for the subsample of firms that already employed Saudis with plot for the full sample. These results disappear when the sample is restricted to firms that had at least one Saudi employee at baseline, and the exit rate effect is no longer statistically significant. This suggests that there may be significant fixed costs in beginning to hire Saudis, resulting in higher compliance costs and therefore higher exit rates for these firms.

The program also had a negative impact on firm size. Figure 7, panel C, plots the percentage point change in firm size relative to the initial percentage point distance from the cutoff. The intercept indicates that firms in the baseline sample grew by around 5 percent on average, and firms above the cutoff appear to have grown at about this rate. For Yellow and Red firms below the cutoff, however, the effect on firm size is dramatic, with the growth of these firms dropping off sharply in cutoff distance. The estimate in Table 3 shows a 12.27 percentage point decrease in firm growth for every percentage point below the cutoff. Estimates of this effect are also negative in the alternative specifications in Table 4.²²

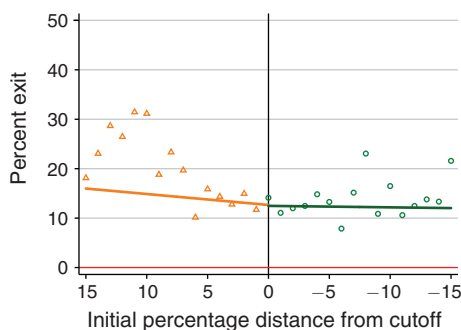
Overall, the evidence suggests that the increase in Saudi employees was not the only effect of the program, and that Nitaqat imposed serious constraints on firm growth over the 16-month period. Although these firms tended to increase their Saudi workforce in response to the program, this result indicates that these firms tended to lose workers overall as visas were restricted. Firms further below the cutoff were more likely to exit and tended to experience significant reductions in firm size.

²⁰ About 9–13 percent of businesses in the United States and the United Kingdom close each year (US Census Bureau 2013; United Kingdom Companies Register House 2013).

²¹ I performed a similar analysis for the effect on Nitaqat on the market value of publicly-listed firms. Unfortunately, the small sample size makes it impossible either to detect a kink in market value changes or to find a sufficiently precise zero. This is also the case for other balance sheet measures available in the Tadawul stock market data for these firms. More information on the data and this analysis appears in online Appendix C.

²² Online Appendix Figures A.1e–A.1h show the RKD figures for changes in firm size and exit rates around the Red/Yellow and Green/Platinum cutoffs.

Panel A. Baseline Saudi employers



Panel B. All firms

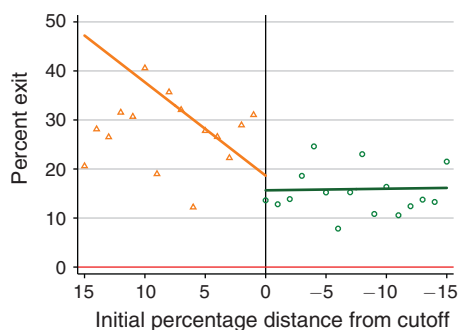


FIGURE 8. EXIT RATE RKD

Notes: This figure shows the graphical RKD exit results for the subsample of those firms with at least one Saudi employee at baseline ($N = 37,076$) and for the full sample of baseline firms ($N = 116,873$). Panel B reproduces Figure 7, panel D. Circles (for Green and Platinum firms) and triangles (for Red and Yellow firms) plot the average outcome variable for firms in one-unit bins based on initial distance from the cutoff. The RKD estimates from the quadratic, bias-corrected Calonico, Cattaneo, and Titiunik (2014b) (CCT) estimator (uniform kernel, CCT bandwidth selector) with robust standard errors are:

	CCT bandwidth (h, b)	Kink	p -value
A. Baseline Saudi employers	(5.48, 9.33)	-2.58	0.16
B. All firms	(3.05, 8.64)	22.16	0.00

The null of equality of these kink estimates is rejected at the 1 percent level.

C. Overall Effects

Table 5 displays estimates for the overall effects of the program. These estimates are based on cell-level difference-in-difference estimates calculating the average effects by initial color band assignment. Odd-numbered columns show comparisons against all firms in the Green band; even-numbered columns allow for “poaching,” or changes in Green firms that were more than five employees above the cutoff (indicated by $Green(> 5)$), by using only Green firms near the cutoff as the comparison group. This effect appears to be particularly important for Saudi hiring, and the conclusions focus on these results. The last two rows of Table 5 show the total estimated effect of the program based on these estimates as well as the relevant full-compliance benchmark. In odd columns, this benchmark is the change in the outcome variable associated with all firms moving up to the relevant Nitaqat quota, with no change in Green and Platinum firms. In even columns, the benchmark includes the effect of all firms above the quota adjusting down to the quota as well.

Table 5 shows that Yellow and Red firms increased their Saudization percentages by 4.01 and 7.18 percentage points on average, with Green firms reducing their Saudization rates by 3.67 percentage points. Overall, the program is estimated to have increased Saudization by 4.25 percentage points, compared to an estimated full-compliance benchmark of 10.94. On the Saudi employment side, Yellow and Red firms increased their Saudi employment by 38 and 56 percent on average, while Green firms reduced their employment of Saudis by 101 percent relative to

TABLE 5—AVERAGE EFFECTS BY COLOR BAND: DIFFERENCES-IN-DIFFERENCES ESTIMATES

	Saudization percentage		Saudi employees		Expatriate employees		Total employees		Percent exit		Baseline firms
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	
Red	7.59 (0.61)	7.18 (0.50)	0.66 (0.22)	0.56 (0.18)	−0.28 (0.03)	−0.27 (0.04)	−0.26 (0.04)	−0.25 (0.04)	11.85 (1.18)	11.67 (1.16)	87,973
Yellow	4.52 (0.38)	4.01 (0.40)	0.51 (0.11)	0.38 (0.15)	−0.15 (0.02)	−0.14 (0.02)	−0.11 (0.02)	−0.11 (0.02)	4.54 (1.88)	4.31 (1.81)	10,035
Green (> 5)		−3.67 (1.13)		−1.01 (0.18)		0.10 (0.03)		0.03 (0.03)		−1.84 (2.20)	1,830
Observations	82,180	82,180	115,159	115,159	115,159	115,159	115,159	115,159	115,159	115,159	
Total est. effect	5.07	4.25	258,000	63,000	−1,024,000	−934,000	−981,000	−948,000	11,000	11,000	
Full compliance benchmark	13.37	10.94	307,000	138,000	−2,424,000	−1,204,000					

Notes: This table reports the average change in Saudi percentage, percent change in the number of Saudi employees, percent change in the number of expatriate employees, percent change in the total number of employees, and exit rates between July 2011 and October 2012 based on initial color band assignment. Comparisons are based on firms in the same industry and size category that were assigned to the Green band. For odd numbered columns, the omitted comparison group is all firms that were initially in the Green color band. In even numbered columns, the comparison group is Green firms that were just above the quota cutoff, with no more than five Saudi employees more than were needed to meet the quota. All regressions include industry-by-size fixed effects. Standard errors are given in parentheses and are clustered at the industry-by-size level. The last two rows compare the implied total estimated effect on the relevant outcome variable with the full-compliance benchmark. In columns 1 and 2, this is the average change in private-sector Saudization, with the benchmark value the implied overall target Saudization rate holding firm size constant; in columns 3 and 4, the increase in Saudi employees; in columns 5 and 6, the decrease in expatriate employees; in columns 7 and 8, the total change in the number of private sector workers; and in columns 9 and 10, the number of firms that exited as a result of the program. Outliers of the dependent variables are Winsorized at the 99 percent level. Percentage changes are calculated using starting values of one for firms with no Saudi or expatriate employees at the start of the period. The smaller sample in columns 1 and 2 reflects the fact that changes in Saudization rates could only be calculated for surviving firms.

the comparison group. The overall effect was to increase Saudi employment by 63,000—about 46 percent of the benchmark of 138,000 and well short of the no-poaching benchmark of 307,000. This implies that Nitaqat was responsible for 37 percent of the total increase in Saudi employment at these firms over the period. There is also evidence that Nitaqat reduced the overall size of the expatriate workforce, with Yellow and Red firms reducing their expatriate employment by 14 and 27 percent and Green firms increasing expatriate hiring by 10 percent relative to the comparison group. Overall, the total estimated effect was a reduction in expatriate employment of 934,000 workers, a decrease of 18 percent relative to the implied counterfactual increase in expatriate employment.

These effects on Saudi and expatriate employment are reflected in the estimates for the changes in total firm size, implying a reduction in total private sector employment of 948,000 workers. The effects on exit rates were largest for Red firms, with these firms 11.67 percentage points more likely to exit than the comparison group. Yellow firms had an average exit rate of 4.31 percentage points higher as a result of the program. Unlike with the other outcomes, Green firms with more than five “excess” Saudi employees did not experience a differential effect on their exit rates. Overall, the effect of the program was to increase exit by 11,000 firms. This is a significant proportion of the 33,000 firms that exited during the period, implying that the program increased exit rates from 19 to 28 percent.

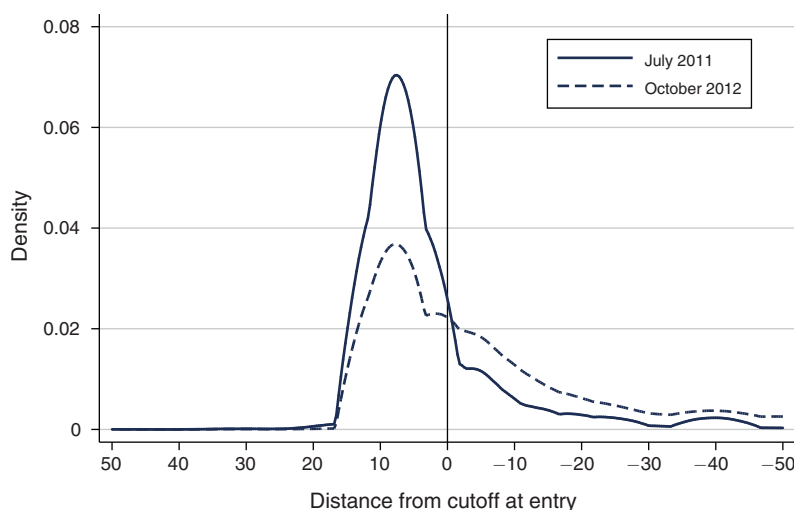


FIGURE 9. COMPOSITION OF NEW ENTRANTS RELATIVE TO QUOTA

Notes: This figure shows the distribution of firms relative to distance from the cutoff (in terms of Saudi employee percentage) at entry for firms that entered the market in July 2011 (solid line) and firms that entered in October 2012. There were 5,276 new entrants in July 2011 and 8,634 new entrants in October 2012. Kolmogorov-Smirnov test p -value: < 0.001 .

In addition to the effects on firms that already existed when the policy was enacted, Nitaqat quotas also affected the composition of new firms that entered the private sector after July 2011. Figure 9 plots the distribution of firms in terms of their distance from the quota (in terms of percent Saudization) for new entrants in July 2011 and in October 2012. A Kolmogorov-Smirnov test rejects the equality of these distributions, and the distribution of October entrants is shifted to the right: firms that entered after the policy took effect tended to have higher Saudization rates than firms that entered before the quotas were enforced. The average effects for all firms that entered between July 2011 and October 2012 are shown in Table 6. Compared with the firms that entered in the first month of data (July 2011), firms that entered afterward had a 4.72 percentage point higher Saudization rate and employed 0.74 more Saudi employees. The firms were also larger, employing an additional 1.76 additional expatriates for a total increase of 2.49 employees. Overall, the total effect of the policy on these new firms was to increase the number of Saudis employed by 30,000 and the total number of expatriates by 72,000.²³ This may be due to the patterns seen in the quota effects on existing firms, which tended to meet Nitaqat requirements by hiring Saudis rather than by replacing expatriates.²⁴ The combined

²³ Unfortunately, the short window of data before the start of the program means that the entrants in July may not be a good comparison group for entrants over the rest of the year, so these estimates are rougher than those in Table 5 and should be interpreted cautiously. As discussed above, this analysis is also not able to account for changes in the number of new entrants, which was likely also affected by the program.

²⁴ Although existing firms appear to have met quotas by hiring additional Saudis, these firms also tended to get smaller overall due to Nitaqat penalties restricting their visa renewals. This loss of expatriate workers appears to be the result of quota enforcement rather than Nitaqat incentives and is not related to baseline quota distance. New firms, which would not experience these penalties prior to formation, seem to have experienced only the incentive effect of adding Saudis, causing them to be larger.

TABLE 6—AVERAGE EFFECTS ON NEW ENTRANTS

	Saudization percentage (1)	Saudi employees (2)	Expatriate employees (3)	Total employees (4)
Post-Nitaqat entrant	4.72 (0.72)	0.74 (0.22)	1.76 (0.72)	2.49 (0.90)
Observations	46,149	46,149	46,149	46,149
Total est. effect		30,000	72,000	102,000

Notes: This table reports the average difference in endline Saudi percentage, number of Saudi employees, number of expatriate employees, and total number of employees for firms that entered between August 2011 and October 2012 relative to firms who entered during July 2011. Comparisons are based on firms that entered the market in the first month of the data in the same industry-by-size category, and all regressions include industry-by-size fixed effects. Standard errors are given in parentheses and are clustered at the industry-by-size level. There were 5,101 new entrants in July 2011 and 41,048 additional entrants between July 31, 2011 and October 13, 2012.

employment effects on existing firms and new entrants are summarized in Table 7. The combined results indicate a total effect of increasing Saudi employment by 93,000 workers (30 percent of the total increase at regulated firms) and decreasing expatriate employment by 862,000 workers. Total private sector employment at regulated firms is estimated to be 846,000 lower than it would have been in the absence of the program, a 53 percent reduction in private sector employment growth.

D. Downsizing to Avoid Quotas

One important way that firms may avoid penalties is by reducing their size below the ten employee cutoff for inclusion in the Nitaqat program.²⁵ Because the Ministry re-codes firms when they leave the program, this will be indistinguishable from exit in the data. If firms in the Yellow and Red bands are more likely to downsize in this way, the above analysis will overestimate the effect of the program on exit (and underestimate the effect on firm size). If this is the case, we would expect to see bunching below the ten employee inclusion threshold in the endline data as well as higher exit rates among Yellow and Red firms with just over ten employees relative to Green firms with the same number of employees. To get a sense of the magnitude of this potential bias, Figure 10, panel A, compares the distribution of firm sizes of all Nitaqat firms in July 2011 and in October 2012. There appears to be little change in the distribution of firm sizes, and there is no apparent decrease in the number of firms near the ten employee cutoff for inclusion in the program. Panel B shows the exit rates for firms above and below the Yellow/Green cutoff. Exit rates are highest for the smallest firms in both groups, reflecting the higher turnover rates for firm in these size bins.²⁶ Exit rates follow the same pattern for firms above and below the Yellow/Green cutoff, and there appears to be no disproportionate increase in exit rate by Yellow firms. Interestingly, the increase in exit rates appears to be relatively

²⁵ See Tran (2013) for evidence on this from Malaysia.

²⁶ This is consistent with previous observations of larger turnover among small firms, e.g., Dunne, Roberts, and Samuelson (1989).

TABLE 7—SUMMARY OF OVERALL EFFECTS

	Saudi employment	Expatriate employment	Total employment	Number of firms
Baseline firms:	+63,000	−934,000	−948,000	−11,000
90% CI lower bound	−57,000	−1,143,000	−1,204,000	−12,000
90% CI upper bound	+184,000	−724,000	−693,000	−9,000
Entrants	+30,000	+72,000	+102,000	
90% CI lower bound	+15,000	+23,000	+41,000	
90% CI upper bound	+45,000	+121,000	+164,000	
Total	+93,000	−862,000	−846,000	−11,000
Baseline total	624,000	5,008,000	5,632,000	117,000
Endline total	1,108,000	7,235,000	8,344,000	84,000
Overall change	+398,000	+355,000	+753,000	−33,000
Counterfactual change	305,000	1,217,000	1,599,000	−22,000
Percent of counterfactual	+30%	−71%	−53%	+50%

Notes: This table reports the total effects on Saudi, expatriate, and total employment at firms in the baseline sample and at firms that entered over the study period based on the estimates in Table 5 columns 2, 4, 6, and 8 and Table 6. The last column reports the change in the number of firms based on the increase in exit rates among baseline firms in Table 5, column 10. The lower panel reports employment in each category and the number of firms in the sample at baseline and endline and the implied counterfactual change in the absence of the program. The estimated causal impact as a proportion of the counterfactual change is reported in the last line.

consistent across firm sizes, and there does not appear to be a differential jump in exit rates near the inclusion cutoff.

VI. Conclusion

As growing unemployment has led to mounting political pressure, national employment quota policies have become an increasingly attractive labor market strategy in many countries in the Middle East. While these programs promise a quick and visible remedy to citizen unemployment, these regulations are potentially quite costly for firms, with the short-term benefits of increasing employment coming at significant cost to long-term economic growth. Recently, political events in many countries in the Middle East have tipped the political economy toward prioritizing short-term stability, and it is likely that these types of quota policies will become even more widely enforced in the region. However, there is little empirical evidence to suggest what the magnitudes of the costs and benefits of such programs might be, even in the short term. Though there is a large literature on the effects of affirmative action policies in the United States, these results have limited applicability to a broad nationalization policy. In particular, affirmative action policies have been applied on a relatively narrower set of firms, and have targeted traditionally disadvantaged groups. Nationalization policies differ from these policies on both counts, and both features are likely to have significant implications for the program effects. For a large-scale nationalization policy, the effect on firms is also critical, with serious consequences for the growth of the often-fragile private sector.

This paper examines the short-term effects of a nationalization quota policy in Saudi Arabia using quasi-experimental variation generated by the program structure.

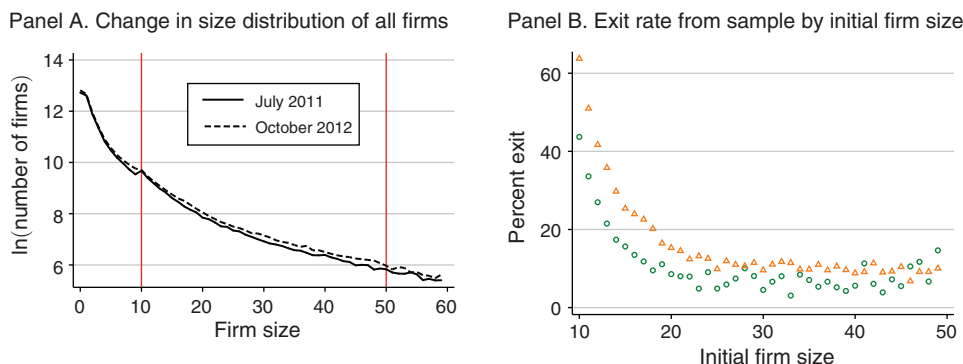


FIGURE 10. STRATEGIC FIRM EXIT

Notes: Panel A shows the distribution of firms by size in July 2011 and in October 2012. Panel B shows the percentage of firms that exited the sample between July 2011 and October 2012 by initial number of employees. Triangles show the exit rates for Yellow/Red firms and circles show the rates for Green/Platinum firms.

On the one hand, this context is quite specific: Saudi Arabia is unique in many ways, and the Nitaqat program is the first to be implemented on such a wide scale. On the other hand, there are many countries with similar labor market features to Saudi Arabia, and there are several features of this policy that make it a good case study. First, the Saudi government devoted significant resources to the program, and it was implemented quickly and uniformly applied to all private sector firms. Enforcement was strict, and the quality of the administrative data is very high. In contrast to many previously studied quota policies, both in the United States and elsewhere, it was an economy-wide program, so the results are more relevant to other national-scale programs. The program was also designed with sharp quota cutoffs, which yield identifying variation in nationalization incentives across firms.

This paper finds that although the Nitaqat program did increase native employment, it had a significant negative effect on firms. The main results indicate that firms increased Saudi employment to meet Nitaqat quotas, though firms further below the quota cutoffs also experienced higher rates of exit and overall downsizing. Supplementary results indicate that the policy increased the growth in Saudi employment in existing firms by approximately 13 percent over a 16-month period, adding 63,000 positions for Saudis to the private sector labor force in these firms, and 30,000 positions at new firms. The program also slowed the growth of the expatriate workforce at these firms, which grew by 934,000 less than it would have in the absence of the quotas. At the same time, the analysis suggests that the costs of constraining the labor market in this way were substantial; the program decreased total employment in the private sector by 948,000 workers and caused nearly 11,000 firms to exit over the first 16 months.

Taken together, the results indicate that the program's quick results in reducing Saudi unemployment have come at significant costs to firms. This is likely due to both the quotas themselves as well as the quick implementation of the policy: a longer phase-in would likely have had more muted effects on exit while preserving many of the program's intended effects. The program is likely to have important long-term

effects as well, which may mitigate some of these short-run costs. In the medium term, firms can adjust their capital investments to decrease the costs associated with employing more high-skilled Saudi labor. More experience and on-the-job training will also make Saudi workers more valuable to private sector firms, decreasing the costs associated with employing Saudis instead of expatriates. Over the long-term, increased national participation in the private sector is likely to better align education and other human capital investments with the demands of private sector work. We would therefore expect to see evolving changes in the wage structure, skill distribution, and demographic composition of the Saudi workforce. The dynamic effects of the program will therefore be at least as important as the short-run impacts, and this will be a critical area for future study. These results also highlight the need for a better understanding of how complementary programs might support firms' transition to employing more Saudis. Ongoing wage-support programs or recruitment support offered by governmental and nongovernmental sources are key areas for more study. More detailed work identifying the type of costs to firms (fixed hiring costs, ongoing wage costs, etc.) would help inform updates to the structure of these programs as well as the design of new support programs to mitigate ongoing and transitional costs to firms.

REFERENCES

- Al-Dosary, Adel S.** 2004. "HRD or manpower policy? Options for government intervention in the local labor market that depends upon a foreign labor force: The Saudi Arabian perspective." *Human Resource Development International* 7 (1): 123–35.
- Al-Lamki, Salma M.** 1998. "Barriers to Omanization in the private sector: The perceptions of Omani graduates." *International Journal of Human Resource Management* 9 (2): 377–400.
- Arab News.** 2012a. "Nitaqat expanded." August 13. <http://www.arabnews.com/nitaqat-expanded>.
- Arab News.** 2012b. "Saudis find salary for truckers low." August 7. <http://www.arabnews.com/saudis-find-salary-truckers-low>.
- Black, Dan A., Jose Galdo, and Jeffery A. Smith.** 2007. "Evaluating the Worker Profiling and Reemployment Services System Using a Regression Discontinuity Approach." *American Economic Review* 97 (2): 104–07.
- Calonico, Sebastian, Matias D. Cattaneo, and Rocio Titiunik.** 2014a. "Robust data-driven inference in the regression-discontinuity design." *Stata Journal* 14 (4): 909–46.
- Calonico, Sebastian, Matias D. Cattaneo, and Rocio Titiunik.** 2014b. "Robust Nonparametric Confidence Intervals for Regression-Discontinuity Designs." *Econometrica* 82 (6): 2295–2326.
- Card, David, David Lee, Zhuan Pei, and Andrea Weber.** 2012. "Nonlinear Policy Rules and the Identification and Estimation of Causal Effects in a Generalized Regression Kink Design." National Bureau of Economic Research (NBER) Working Paper 18564.
- Card, David, David S. Lee, Zhuan Pei, and Andrea Weber.** 2015. "Inference on Causal Effects in a Generalized Regression Kink Design." *Econometrica* 83 (6): 2453–83.
- Chay, Kenneth Y.** 1998. "The Impact of Federal Civil Rights Policy on Black Economic Progress: Evidence from the Equal Employment Opportunity Act of 1972." *ILR Review* 51 (4): 608–32.
- Chin, Aimee, and Nishith Prakash.** 2011. "The redistributive effects of political reservation for minorities: Evidence from India." *Journal of Development Economics* 96 (2): 265–77.
- Dunne, Timothy, Mark J. Roberts, and Larry Samuelson.** 1989. "The Growth and Failure of U.S. Manufacturing Plants." *Quarterly Journal of Economics* 104 (4): 671–98.
- El-Katiri, Laura, Bassam Fattouh and Paul Segal.** 2011. *Anatomy of an oil-based welfare state: Rent distribution in Kuwait*. Kuwait Programme on Development, Governance and Globalisation in the Gulf States. London, January.
- Fan, J., and I. Gijbels.** 1996. *Local Polynomial Modelling and Its Applications*. London: Chapman and Hall.
- Fang, Hanming, and Peter Norman.** 2006. "Government-Mandated Discriminatory Policies: Theory and Evidence." *International Economic Review* 47 (2): 361–89.

- Forstenlechner, Ingo, Mohamed T. Madi, Hassan M. Selim, and Emilie J. Rutledge.** 2012. "Emiratization: Determining the factors that influence the recruitment decisions of employers in the UAE." *International Journal of Human Resource Management* 23 (2): 406–21.
- Forstenlechner, Ingo, and Emilie Rutledge.** 2010. "Unemployment in the Gulf: Time to Update the 'Social Contract.'" *Middle East Policy* 17 (2): 38–51.
- Fryer, Roland G., Jr., and Glenn C. Loury.** 2013. "Valuing Diversity." *Journal of Political Economy* 121 (4): 747–74.
- Global Bilateral Migration Database.** 2011. World Bank Group, Ç. Ozden, C. Parsons, M. Schiff, and T. L. Walmsley. <http://data.worldbank.org/data-catalog/global-bilateral-migration-database> (accessed January 1, 2013).
- Griffin, Peter.** 1992. "The Impact of Affirmative Action on Labor Demand: A Test of Some Implications of the LeChatelier Principle." *Review of Economics and Statistics* 74 (2): 251–60.
- Hertog, Steffen.** 2014. "Arab Gulf States: An Assessment of Nationalisation Policies." Gulf Labour Markets and Migration (GLMM) Research Paper 1/2014.
- Holzer, Harry, and David Neumark.** 2000. "Assessing Affirmative Action." *Journal of Economic Literature* 38 (3): 483–568.
- Howard, Larry L., and Nishith Prakash.** 2012. "Do employment quotas explain the occupational choices of disadvantaged minorities in India?" *International Review of Applied Economics* 26 (4): 489–513.
- Kurtulus, Fidan Ana.** 2015. "The Impact of Affirmative Action on the Employment of Minorities and Women over Three Decades: 1973–2003." Upjohn Institute Working Paper 15-221.
- Lee, David S., and Thomas Lemieux.** 2010. "Regression Discontinuity Designs in Economics." *Journal of Economic Literature* 48 (2): 281–355.
- McCrary, Justin.** 2008. "Manipulation of the running variable in the regression discontinuity design: A density test." *Journal of Econometrics* 142 (2): 698–714.
- Miller, Conrad.** Forthcoming. "The Persistent Effect of Temporary Affirmative Action." *American Economic Journal: Applied Economics*.
- Peck, Jennifer R.** 2017. "Can Hiring Quotas Work? The Effect of the Nitaqat Program on the Saudi Private Sector: Dataset." *American Economic Journal: Economic Policy*. <https://doi.org/10.1257/pol.20150271>.
- Prakash, Nishith.** 2009. "Improving the Labor Market Outcomes of Minorities: The Role of Employment Quota." Institute for the Study of Labor (IZA) Discussion Paper 4386.
- Ramady, M.** 2013. "Gulf unemployment and government policies: Prospects for the Saudi labour quota or Nitaqat system." *International Journal of Economics and Business Research* 5 (4): 476–98.
- Randeree, Kasim.** 2009. "Strategy, Policy, and Practice in the Nationalization of Human Capital: 'Project Emiratization.'" *Research and Practice in Human Resource Management* 17 (1): 71–91.
- Randeree, Kasim.** 2012. "Workforce nationalization in the Gulf Cooperation Council states." Georgetown University Center for International and Regional Studies Occasional Paper 9.
- Sadi, Muhammad Asad.** 2013. "The Implementation Process of Nationalization of Workforce in Saudi Arabian Private Sector: A Review of 'Nitaqat Scheme.'" *American Journal of Business and Management* 2 (1): 37–45.
- Sowell, Thomas.** 2005. *Affirmative Action Around the World: An Empirical Study*. New Haven: Yale University Press.
- Tran, Trang.** 2013. "The impact of affirmative action and equity regulations on Malaysia's manufacturing firms." http://conference.iza.org/conference_files/worldb2014/tran_t8194.pdf.
- United Kingdom Companies House.** 2013. "Companies Register Activities." <http://www.companieshouse.gov.uk/about/busRegArchive/businessRegisterStatisticsDec2013.pdf>.
- US Census Bureau.** 2013. "Business Dynamics Statistics." <https://www.census.gov/ces/dataproducts/bds/>.