

The impact of affirmative action and equity regulations on Malaysia's manufacturing firms

Trang Tran*

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Abstract

This paper studies affirmative action policies in Malaysia, focusing on a specific policy in the private sector. In particular, I examine the impact of a regulatory change which no longer requires foreign-owned manufacturers above a certain size to set aside 30% of their equity for (ethnic) Malay shareholders. I set up a theoretical model to show that the original policy results in a range of firms to stay inefficiently small. Removing this equity requirement for foreign firms leads to two effects: (i) foreign firms become less likely to be sized constrained, and (ii) their average size increases relatively to other firms. These predictions are supported by empirical evidence from difference-in-differences estimations, based on firm-level data from the Malaysia Productivity and Investment Climate Survey in 2002 and 2007.

1 Introduction

During Malaysia's most recent general election in May 2013, criticisms against the country's affirmative action policies became a leading attack argument from the opposition party (The Economist 2013). This decades-old set of official ethnic discrimination was first implemented in 1971 under the New Economic Policy (NEP) to address ethnic tension between the Bumiputera (or "sons of the soil," implying ethnic Malays and other indigenous groups) and the Chinese. Initially introduced as a temporary measure, most of the NEP policies have stayed on until this day even as it is increasingly considered as a hindrance to the country's efficiency as well as the source of resentment by Chinese and Indian groups.

Widely regarded as one of the most comprehensive packages of affirmative action in the world, the NEP policies include measures favoring Bumiputera in a wide range of areas. In the public sector, large shares of university admissions and job quotas are reserved for Bumiputera. In the private sector, companies had to ensure that at least 30% of their shares as well as employment were held by this group. Government contracts also explicitly favor Bumiputera businesses (The

*World Bank. Email: ttran6@worldbank.org

Economist 2003, Jomo 2004). While affirmative action policies are also prevalent in many other parts of the world, comprehensive pro-Bumiputera policies in the private sector is a unique feature of Malaysia's NEP.

There has been a relatively large body of analyses on the effects of NEP establishing its effect in increasing the education level and asset ownership of the Malays (Ong 2012). However, rigorous research of its impact on the private sector is scant. In this paper, I attempt to fill a gap in the literature by studying the impact of the NEP policies on businesses. I focus on the manufacturing sector, which experiences a regulatory change that relaxes the rule imposing equity restrictions on foreign-owned firms. This rule, which previously required all firms above a certain size threshold to reserve 30% equity for Bumiputera, was fully abolished for all foreign manufacturing projects since 2003.

I set up a simple theoretical model to show that the original policy results in a distortion that renders some firms to stay below their optimal employment size. Moreover, the policy change leads to two effects: (i) foreign firms are less likely to be sized constrained, and (ii) their average size increases relatively to other firms. My empirical analysis uses data from two rounds of the Malaysia Productivity and Investment Climate Survey in 2002 and 2007. I test for the above predictions in a reduced-form difference-in-difference framework. More specifically, I compare the outcomes of foreign and domestically owned firms between the first and the second survey rounds, which correspond to before and after the policy change.

My empirical results are consistent with the theoretical predictions. I find that the policy significantly increases employment in foreign firms by 18-19%. Foreign firms that are below the size threshold in the first period are also 20% less likely to report that they are operating below the optimal level of employment. Further estimates with alternative definitions of foreign ownership and sample selection suggest that the results are robust. Moreover, I check for whether my results could be caused by another policy change in this period which relaxes regulations on expatriate employment and find evidence suggesting that this not the case.

The rest of the paper is organized as follows. Section 2 describes the institutional background, emphasizing the NEP policies in the manufacturing sector and the policy change in 2003. Section 3 presents a brief review of the literature. In section 4, I set up a theoretical model to motivate my hypotheses about the impact of this policy change on firms' employment size. Section 5 introduces the data and empirical framework used to test these hypotheses. Section 6 discusses the empirical results. Section 7 concludes.

2 Institutional background

Malaysia is a multi-racial country with a history of strong ethnic disparities and severe marginalization of the Bumiputera in economic activities. The ethnic composition in Malaysia is roughly 60% Bumiputera, 25% Chinese and the rest Indian and other ethnic groups. However, at the end

of the British rules in 1957, Bumiputera accounted for only 2.5% of corporate assets against over 30% for the Chinese (The Economist 2003). Inter-ethnic tension between the Bumiputera and the Chinese escalated and eventually erupted into street riots on May 13th 1969. This single event led to 200 deaths and prompted the government to respond with one of the most comprehensive packages of affirmative action in the world.

The set of affirmative action policies were introduced in 1971 through the New Economic Policy (NEP). The rhetoric focus of the NEP was both “poverty eradication regardless of race” and “restructuring society to eliminate the identification of race with economic function”. In practice however, it had grown to emphasize and be associated mainly with the second objective (Jomo 2004). Overall, the NEP intended to pursue (a) correction of income imbalances existing between Bumiputera and other ethnic groups; (b) restructuring of the employment pattern; (c) restructuring of the inter-ethnic ownership of share capital in limited companies; and (d) the creation of a Bumiputera commercial and industrial community. The NEP set a specific target of 30 per cent ownership and control of the corporate sector by Malays and Malay interests by 1990. In addition, it also proposed that the Malays, who represent half of the population, proportionately participate in the commercial and industrial sectors which should lead to realization of a Bumiputera commercial and industrial community. With regard to employment, it expected private sector companies to accommodate at least 30 per cent of managers/senior management from among Bumiputeras (Onozawa, 1991).

While the NEP officially ended in 1990, most of its policies of favoring the Bumiputera still remains in effect through Malaysia’s subsequent National Development Policy (NDP) for 1991-2000 and the National Vision Policy (NVP) implemented from 2001. Below, I describe in more details the Bumiputera equity and employment quotas in the manufacturing sector. Next, I present a discussion on the criticisms of these policies and the change in equity requirements that will be analyzed in this paper.

2.1 Affirmative action and policy instruments in manufacturing

The NEP comprises a wide range of policies in education, public sector employment, business and asset ownership. My focus in this paper is the rule in the manufacturing sector that 30% equity and employment of private firms have to be reserved for Bumiputera. The main policy instruments used to enforce this requirement are implemented under the Industrial Coordination Act (ICA) 1975. The ICA primarily aims to direct growth in the manufacturing sector through its approval of manufacturing licenses. This license is essential for firms above a certain size threshold to operate legally or to obtain any formal government incentives, government contracts and to participate in exports.

For private manufacturing firms, the latest ICA revision requires that all manufacturers with size above 75 employees or with shareholders’ funds exceeding RM 2.5 million to apply to the Ministry of International Trade and Industry (MITI) for a license (MIDA 2012). The approval

of this license as well as any expansion and diversification projects is conditional on whether the NEP guidelines of minimum 30% Bumiputera participation have been met in shareholders' equity, employment share, Board of Directors and appointment of Malay distributors (Searle 1999).

2.2 Regulatory changes in the sample period

The effects of this equity policy are controversial. On the one hand, it is widely considered to have successfully created a Malay urban middle-class in the span of a little over a generation (Ong 2012). Even the most conservative government estimates put the share of business equity owned by Bumiputera in 2004 at 18.7% (Centre for Public Policy Studies 2005). On the other hand, many criticisms are directed towards the inefficiencies that the policy creates. What the policy meant is that large companies are required to restructure their ownership to ensure Bumiputera's participation either through individual involvement or trust agencies. As a result, the policy's most deleterious effects was probably due to the fact that it introduced so much uncertainty into businesses planning that it was a disincentive against which all forms of incentive appeared unattractive (Searle 1999, Gomez and Jomo, 1999). Many Chinese companies are believed to have chosen to stay small and private, rather than growing to the point of having to comply with the NEP's requirements. Critics also argue that the policy has acted as a barrier to foreign investment and that only the Malay elite has benefited from it (The Economist 2003, 2009). An early estimate puts the amount of capital flight due to the ICA's pro-Bumiputera requirements at 12 billion USD from 1975 to 1984 (Lee 2002).

The policy proves to be increasingly unsustainable given competition for foreign investments from neighboring countries. As a result, to attract foreign investment, since June 2003, Malaysia's government fully liberalized equity holdings in all foreign manufacturing projects (The Economist Intelligence Unit 2004). The new equity policy also applies to companies that operated prior to the changes but only recently became large enough, that is, exceeded shareholders' funds of RM 2.5m or those that engage 75 or more full-time employees, and are thus required to be licensed.

In this paper, I aim to test empirically whether this regulatory change has any impact on firm size in terms of employment. The reason to focus on firm size in terms of employment as opposed to equity is due to data availability. My sample covers only two years of data and the percentage of firms that started business during the sample period is negligible (see Data section). Given raising equity is a rare event for firms, it is infeasible to analyze the impact on equity using the available data.

3 Literature review

While many analyses of Malaysia's NEP policies exist, the majority contains descriptive statistics documenting trends in different outcomes for Bumiputera and other ethnic groups over time. The

only two existing rigorous studies that I am aware of focus on the effects in education, employment and wages. A recent paper by Ong (2012) looks at the NEP impact in public education, and suggests that affirmative action in secondary education did not affect the earnings of Malay secondary school graduates relative to their Chinese counterparts. Conversely, since there is capacity constraint in tertiary education, quotas reserved under the NEP led to an increase in the Malay-Chinese wage gap among tertiary graduates. In an earlier study, Fang and Norman (2006) document the widening Chinese/Malay (positive) wage gap since the NEP adoption using household data from the Malaysian Family Life Survey. To explain this gap, they introduce a model with two features: (i) there is imperfect information about skills in the labor market, and (ii) exclusion to public jobs creates better incentives for the minority group to invest in private sector skills. As a result of discrimination policy, the minority group is able to overcome informational free-riding problem. If this positive effect outweighs the direct effect in the public sector, it is possible for them to have higher wage in equilibrium.

My paper contributes to understanding of the NEP's impact in the private sector. I specifically consider a policy change that aims to address one of the NEP's criticisms. As a study on firm size distortions, my paper is also related to the recent literature on misallocation of resources and its consequences for aggregate productivity. This literature has shown theoretically and empirically how distortions in the labor or capital market can reduce aggregate output through allocating resources away from high productivity to low productivity firms. For example, Hsieh and Klenow (2009), one of the most prominent papers in this literature, documents that misallocation can account for a large proportion of the productivity gap between China, India and the US.

A paper more closely related to my research is Garicano, LeLarge and Van Reenen (2013). They examine a specific set of labor laws in France as the source of distortion rather than using a theoretical distortion term as in most of the rest of the literature. The paper shows that these regulations, which impose significant labor costs on firms that exceed a certain size, lead to firms inefficiently staying below this size. Structural estimations using census data suggests the cost due to this size distortion can range from 1-5% of GDP, depending on wage flexibility. Similarly, Braguinsky, Lee and Regaterio (2011) show that Portugal's strong labor protection laws have contributed substantially to the continuing shift of the Portuguese firm size distribution to the left. Their calibration exercises indicate that large growth effects could arise if the distortions were lessened or abolished altogether.

A limitation of my work compared to these papers is a much smaller sample size since I use survey data instead of census data. Moreover, my analysis cannot consider general equilibrium effects. On the other hand, I am able to observe a policy change during my study period, and this allows me to examine how firm size can be affected by actual changes in the extent of the policy distortions.

4 Model and hypotheses

In this section, I present a simple theoretical model to demonstrate the impact of the policy change on firm size. Assume that the firm produces output Y following a Cobb-Douglas function in capital K , labor L and productivity A drawn from some $f(A)$ distribution. Let $\pi(A)$ then be the profit function of the firm:

$$\pi(A) = AK^\alpha L^\beta - (r + \bar{\gamma})K - (w + \bar{\tau})L, \text{ with } \begin{cases} \bar{\gamma} = 0, \bar{\tau} = 0 & \text{if } L \leq \bar{L} \\ \bar{\gamma} = \gamma, \bar{\tau} = \tau & \text{if } L > \bar{L} \end{cases}$$

where r is the rental rate of capital and w is the wage rate. When employment passes a certain size threshold \bar{L} , the firm incurs additional costs in terms of both labor and capital. This assumption follows the regulation that firms have to reserve 30% equity and employment to Bumiputera once their size gets past 75 full-time employees.¹ If search cost for Bumiputera shareholders and employees are higher on average then these additional costs, γ and τ , are positive.² In other words, firms above the size threshold \bar{L} incur higher per unit capital and labor costs.³

The first order conditions for the profit maximization problem of the firms with respect to labor and capital are:

$$\begin{aligned} \alpha \frac{Y}{K} &= r + \bar{\gamma} \\ \beta \frac{Y}{L} &= w + \bar{\tau} \end{aligned}$$

From these FOCs, the optimal labor choice for the firm is given by:

$$L^{1-\alpha-\beta} = A(r + \bar{\gamma})^{-\alpha} (w + \bar{\tau})^{\alpha-1} \frac{\alpha^\alpha}{\beta^{\alpha-1}} \quad (1)$$

$$\Leftrightarrow A = L^{1-\alpha-\beta} (r + \bar{\gamma})^\alpha (w + \bar{\tau})^{1-\alpha} \delta \quad (2)$$

where $\delta = \beta^{\alpha-1} / \alpha^\alpha$.

From equation (1), it is clear that the firm's optimal size is increasing in its productivity A . Moreover, equation (2) shows that the values of A that make a firm unconstrained in choosing its

¹I model these costs as variable costs only. There might also be fixed costs given the firm has to restructure but adding fixed costs does not change the comparative statistics in this set up.

²This is likely the case since Bumiputera employees are in general less skilled than Chinese and foreign workers. In addition to search cost for Bumiputera shareholders, there might also be disutility cost of diluting shares. Searle (1999, p.44) for example, claims that the ICA was vigorously opposed by both Chinese and foreign business, who "loath to transfer 30 percent equity to Malays".

³This assumption of higher total capital cost for firms above \bar{L} depends partly on the assumption that r does not change with size. It might be violated for very large firms if they are able to borrow sufficiently more cheaply, for example, because of investment incentives or because of market power. Nevertheless, it is likely to hold for firms close to the size threshold.

size (in other words, when the firm can choose its optimal L according to the FOCs) are:

$$\begin{cases} A \leq A^1 = \delta \bar{L}^{1-\alpha-\beta} r^\alpha w^{1-\alpha} \\ A > A^2 = \delta \bar{L}^{1-\alpha-\beta} (r + \gamma)^\alpha (w + \tau)^{1-\alpha} \end{cases}$$

where $A^1 < A^2$ given the assumptions that $\gamma, \tau > 0$ and $\alpha, \beta \in (0, 1)$.

For all productivity draws between (A^1, A^2) , the firm is constrained in its size. At $A = A^1$, the optimal size is $L = \bar{L}$. Since optimal size is increasing in A , it follows that all firms whose $A \in (A^1, A^2)$ also choose $L = \bar{L}$. At $A = A^2$, the firm is indifferent between staying below and going above the size threshold since profits are equal under those two choices.

In summary, firms with productivity below A^1 optimally stays under \bar{L} . Firms with productivity above A^2 can also choose their labor optimally above \bar{L} . For firms whose productivity are in between A^1 and A^2 , they are size constrained and choose to hire exactly \bar{L} workers. Intuitively, these are the firms with productivity values such that it is too costly to hire more labor than the threshold and subject to the additional costs. However, their productivity is high enough so that they would like to have size larger than \bar{L} if not for the distortion caused by the size-dependent regulation.

Now suppose the policy changes so that a subset of firms no longer have to satisfy the 30% Bumiputera equity condition. In other words, there is no additional capital cost, i.e. $\bar{\gamma} = 0$ when $L > \bar{L}$, when these firms exceeds the threshold \bar{L} (additional labor cost still present since the 30% Bumiputera employment condition is still in place). As a result, the upper bound of A such that a firm is no longer size constrained becomes smaller for a subset of firms. Let this threshold be \tilde{A}^2 then:

$$\tilde{A}^2 = \delta \bar{L}^{1-\alpha-\beta} r'^\alpha (w' + \tau')^{1-\alpha} < A^2 = \delta \bar{L}^{1-\alpha-\beta} (r' + \gamma')^\alpha (w' + \tau')^{1-\alpha}$$

Note that there is a new subscript on wages and capital rental rates as well as their additional costs in the above expression. In a general equilibrium model, changes in firms' labor demand can change the equilibrium prices of labor and capital. For simplicity, I am only using a partial equilibrium model and do not model these effects but allow for prices to be different with the policy change.

Denote the set of firms that are subject to the policy change as F . If all firms have the same support of the productivity draw A then the proportion of firms $\in F$ that are constrained to be too small is smaller under the new policy change :

$$Pr(L < L^{optimal})|_{\in F} = \int_{A^1}^{\tilde{A}^2} f(A) dA < Pr(L < L^{optimal})|_{\notin F} = \int_{A^1}^{A^2} f(A) dA$$

We can also predict how the the average firm size changes with the policy given the new

productivity threshold. The average size for firms not affected by the regulation change is then⁴:

$$\begin{aligned} E(L)|_{\notin F} &= E(L)|_{A < A^1} Pr(A < A^1) + \bar{L} Pr(A^1 < A < A^2) + E(L)|_{A > A^2} Pr(A > A^2) \\ &= E(L)|_{A < A^1} Pr(A < A^1) + \bar{L} [Pr(A^1 < A < \tilde{A}^2) + Pr(\tilde{A}^2 < A < A^2)] \\ &\quad + E(L)|_{A > A^2} Pr(A > A^2) \end{aligned}$$

where $E(L)$ is the average firm size in any range of A given equation (1).

The average size for firms that are affected by the regulation change is:

$$\begin{aligned} E(L)|_{\in F} &= E(L)|_{A < A^1} Pr(A < A^1) + \bar{L} Pr(A^1 < A < A^2) + E(L)|_{A > A^2} Pr(A > A^2) \\ &= E(L)|_{A < A^1} Pr(A < A^1) + \bar{L} Pr(A^1 < A < \tilde{A}^2) + E(L)|_{A > \tilde{A}^2} Pr(\tilde{A}^2 < A < A^2) \\ &\quad + E(L)|_{A > A^2} Pr(A > A^2) \end{aligned}$$

From the above two equations, it clearly follows that foreign firms have higher size on average. Intuitively, the average size of foreign firm has to be higher since there is a range of productivity where foreign firms can choose size above \bar{L} optimally while other firms cannot..

In summary, these predictions form the following hypotheses, which will be tested empirically:

Hypothesis 1: *The average size of foreign firms increases after the regulation change.*

Hypothesis 2: *The relative probability of foreign firms being constrained to be too small decreases after the regulation change.*

5 Empirical tests

5.1 Data

My analysis is based on two rounds of data from the Malaysia Productivity and Investment Climate Survey (PICS) I and II. The first and second rounds are conducted in 2002 and 2007 respectively, thus covering firms both before and after the regulation change in 2003. These surveys are part of the World Bank's Enterprise Survey series and are jointly conducted with the Government of Malaysia. The surveys include firms in both manufacturing and business support services sectors. However, I only use data for manufacturing firms, which are subject to regulations by the ICA.

The two rounds share a similar sampling method and the same sets of questionnaires. The sampling frame comes from the Central Register of Establishments maintained by the Department of Statistics. Samples are drawn following a single-stage stratified sampling method. Within each sector, firms are stratified by location and industry, and are drawn proportionally according to the

⁴The expression below ignores the lower threshold of A which results in zero profits. In the non-trivial case where this threshold is below A^1 , the results do not change since the threshold would be the same regardless of whether the firm is subjected to the regulation change or not.

total sample size.⁵ They are representative of the whole economy but only establishments with employment size above 10 are included for the manufacturing sector (World Bank 2009).

The data cover identification information such as firm location, year starting operation, legal status as well as detailed ethnic and nationality composition of shareholders. Firms' economic activities are defined according to Divisions (2-digit codes) under the Malaysia Standard Industrial Classification (MSIC) 2000, which is identical to the ISIC Rev. 3.1 up to the 4-digit level. The final sample size for manufacturing firms is 1115 and 902 observations in the first and second survey round respectively, of which 976 are panel observations. Table 1 presents the distribution of firms by industry in both rounds. Figure 2 displays the distribution of firms by age group. It shows that the presence of newly established firms is negligible this data set. As explained above, this limitation is partly the reason for my analysis to focus on employment instead of equity as an outcome.

The firm questionnaire includes questions on firms' opinions about investment climate that are standard in the Enterprise Survey series as well as recall balance sheet information on employment, capital, investment, etc. Balance sheet data are available for 6 years, 1999-2001 and 2004-2006.

Ethnic and nationality of shareholders are only available for 2 years (2001 and 2006). Table 3 shows the firm-level average percentages of shares held by each group of shareholders by survey round. Since these are my main variables of interest, my analysis makes use of only these two years of data. Table 4 shows the pooled summary statistics of firm characteristics for 2001 and 2006. About 28% of firms in the sample can be classified as foreign (defined as 30% or more shares being held by foreigners). Roughly half have either more than 75 permanent workers or shareholders' equity above 2.5mil RM and are thus subject to the licensing requirement under the ICA. Given these percentages, my sample has relatively good balance of firms in the "treated" and "control" groups (defined below).

5.2 Model and estimation strategy

I test Hypotheses 1 and 2 using a difference-in-difference (DID) approach. Given the timing of the policy, the post "treatment" period is the second wave of the survey. I define the "treated" group as firms that are foreign-owned, as they are the ones that are subjected to the regulatory change. Domestic firms then constitute the "control" group.

The above definition is dictated by data availability. Ideally, one would want to define the treated and control groups more precisely according to the firm's size in 2001. The ideal treated and control groups would be foreign firms that are just below the size threshold in 2001, and domestic firms of the same size, respectively. However, this categorization is not feasible due to the small sample size. Figure 1 displays the distribution of firms in both sample periods, showing that the percentage of firms close to the size threshold is relatively small. For example, only 11%

⁵The PICS sampling unit is establishment. I use firm and establishment interchangeably from here onwards.

of firms in the panel sample have between 50-75 employees in 2001, which results in a total of only 100 panel observations.

Alternatively, since only foreign firms in the manufacturing sector are affected by the policy change, foreign firms in the services sector can also serve as the control group. This construction of control and treatment groups is likewise infeasible however since I only have data for services firms in the second period. In sum, I use the full sample of manufacturing firms. I will also consider the sub-sample of firms which were below the size threshold in 2001. Intuitively, these are the firms where we should observe a larger impact of the policy change. Table 5 presents summary statistics of the firms by their treatment status, both before and after the policy change. Foreign firms are generally larger both in terms of employment and assets, which suggest that the DID analysis needs to control for these differences.

Hypothesis 1 is tested in the following linear regression:

$$\ln(emp)_{it} = \alpha_{i0} + \alpha_1 Foreign_{it} + \alpha_2 after + \alpha_3 Foreign_{it} \times after + \alpha_4 X_{it} + \varepsilon_{it} \quad (3)$$

where $\ln(emp)_{it}$ is log of the total number of all permanent employees at firm i in year t .⁶ $Foreign_{it}$ is an indicator denoting if at least 30% shares of the firms are owned by foreigners,⁷ and $after$ denotes the second survey round. Controlling for the period dummy takes into account the effect of any other factors that could affect all firms to the same extent. I also control for $Foreign_{it}$ given that foreign firms are often different from domestic firms in various characteristics, including size. In addition, I include in X_{it} a set of city fixed effects (FE), industry FE and their interactions with time. Since foreign firms can be disproportionately represented in certain locations and industries, controlling for these FE ensures that my results are not due to confounding effects of other policies that are location or industry-specific and constant throughout the study period. Finally, I include firm FE to control for productivity and other time-invariant unobservables that could be correlated to foreign ownership and affect firm size at the same time. Because the panel sample is significantly smaller than the pooled sample, I also run equation (3) without fixed effects and control for firm age in those specifications to test for the prediction in the full sample.

The coefficient of interest is α_3 . Testing Hypothesis 1 is equivalent to testing $\alpha_3 > 0$, that is, if foreign firms are becoming larger on average in the second period. My identification assumption is that conditional on firm FE and other controls included in X_{it} , there are no omitted effects impacting employment of foreign firms and domestic firms differently over time so the DID results can be attributed to the policy change that affects only foreign firms.

For testing Hypothesis 2, the question used to construct my dependent variable comes from the questionnaire’s section on labor relations. More specifically, the questions asks: “*Given your current level of output, if you were free to choose without restrictions your current level of employ-*

⁶This measure is taken from the section on “Labor and human resources” in the firm questionnaire. I do not include temporary workers since part-time employment is included in the number of temporary workers and the size threshold in the ICA regulation is with respect to full-time employees only.

⁷I will consider other indicators of “foreign” in the robustness checks.

ment what percentage of the current level would you choose?”. I construct a categorical variable which takes the value of 1,2 and 3 if the firm response is more than 100 percent, equal to 100 percent, and less than 100 percent respectively. I test for Hypothesis 2 in the following generalized ordered logit specification:

$$Pr(y_i > k) = g(\delta_k + Z_i\beta_k) = \frac{\exp(\delta_k + Z_i\beta_k)}{1 + \exp(\delta_k + Z_i\beta_k)} \quad (4)$$

where

$$Z_i\beta_k = \beta_{k1}Foreign_{it} + \beta_{k2}after + \beta_{k3}Foreign_{it} \times after + \beta_{k4}X_{it}$$

and $k = 1, 2, \dots, M - 1$. M denotes the number of categories of the dependent variable ($M = 3$ in this case). I consider both the general case where the slope β 's are allowed to differ across k and the more parsimonious model where β 's are restricted to be the same (the ordered logit).

As in the previous regression, I include the set of firm characteristics and fixed effects in X to control for possible correlations of foreign ownership with other factors affecting firm size. The coefficient of interest is β_{k3} where $k = 1$. However, since coefficient estimates in this model are often hard to interpret,⁸ I will report marginal effect estimates. Hypothesis 2 implies a negative marginal effect of the interaction term $Foreign_{it} \times after$ on the outcome $y_i = 1$.

6 Results and discussion

6.1 Main results

Table 6 presents results from equation (3).⁹ Column (1) show the results in the pooled sample with the full set of time-varying city and industry FE. The results show that foreign firms are larger on average. The coefficient on the interaction term between foreign and the period dummy indicates their size increases by 16.3 percent after the regulation change but it is not significant. Column (2) shows the results in the panel sample with firm FE. The effect of being foreign owned becomes negative but insignificant when firm FE are controlled for. The policy change effect in this specification is smaller than in column (1) and is also insignificant. When I further control for the set of location and industry year FE in column (3), the coefficient on the interaction term is of similar magnitude as in column (1) and becomes significant at 5%. The results indicate that the change in equity policy has the effect of increasing size of foreign firms by 18.7 percent on average. The positive effect on employment is as predicted by Hypothesis 1.

Columns (3)-(6) display the results with the same specifications as in columns (1)-(3) but in a

⁸Hypothesis 2 states that the probability of foreign firms constrained to be too small decreases in the period after the regulation change. Since the probability of being “too small” is $1 - Pr(y_i > 1) = 1/(1 + e^{Z_i\beta_1})$, which decreases in Z_i if $\beta_1 > 0$, this implies $\beta_{13} > 0$.

⁹All standard errors are clustered at the firm level. The results are from a sample dropping the top and bottom 5% tails employment. I also drop publicly listed firms from the sample since they are not subject to the same regulation change. The results are however insensitive to whether they are included or not.

sub-sample where I only include firms that are below the size threshold, that is having less than 75 employees, in 2001. The results are qualitatively similar as in the full sample. The coefficient on the interaction between foreign and after in column (6) becomes more imprecisely estimated than in column (3) since the sample size reduces. However, its magnitude also increases, which should be the case since the policy should have an effect mostly on firms that were below the size threshold in the initial period.

Before going into the regression results on Hypothesis 2, I first check for changes in the proportions of firms with different size constraints in table 7. The results suggest that the number of foreign firms reporting being smaller than optimal has decreased in the second period but no similar changes are observed for other firms. Next, table 8 presents formal results with marginal effect estimates for each outcome of the dependent variable from equation (4). I report results from both the ordered logit and the generalized ordered logit in the upper and lower panels respectively.¹⁰ The marginal effect estimates of $Foreign_{it} \times after$ on the first outcome (i.e. on the probability of firm size being “too small”) have the same expected sign in both models and across different specifications. However, its estimated marginal effects on the other two outcomes are different in signs, magnitude and significance level in the ordered logit model compared to the generalized logit model. Results from Wald tests for the restrictions on equality of coefficients in the ordered logit model, i.e. $\beta_k = \beta$ for all k in equation (4), suggest that the ordered logit is too restrictive.¹¹ Therefore, my preferred model is the generalized model where the coefficients β_k are allowed to be different across k . In the discussion below, I focus on the results from this model.

Column (1) reports the full sample results when I control for the full set of location and industry-specific year FE.¹² The results suggest that foreign firms are 7% less likely to report being too small in the second round but the marginal effects are imprecisely estimated. Next, columns (2) shows estimation results from the sub-sample of firms whose size is below the 75 employee threshold in 2001. In this sample, the estimated impact of being foreign owned after the policy change is statistically as well as economically significant. Given the marginal effect estimate on “foreign,” the results suggest that the policy has reduced the probability of foreign firms being smaller than the optimal size by around 20%. Moreover, there is no evidence that there is an impact on the probability of firms being “too large.” As a result, the probability of firms being of optimal size also increases by about 20%.

Lastly, column (3) reports estimation results from the same specification as in column (2) but in the sample where firms were already above the size threshold in 2001. Since the policy

¹⁰Note that unlike in the previous results from equation (3), my results in this table only control for state instead of city FE. The reason is that the results do not converge in some of the specifications. Results are otherwise insensitive to whether I control for city or state FE.

¹¹The Wald tests are performed on each variable in the model iteratively. The tests fail for a range of industry and location FE. A global LR test also rejects the null hypothesis that the slopes are the same for all k at 0.01 level of significance (The test statistics for the samples in columns 1, 2, and 3 are $\chi^2(39) = 106.49, 78.68$ and 78.78 respectively). LR test results however do not take into account clustering.

¹² Results are also similar when I do not control for these FE. For brevity, I only include estimations with the full set of FE in this table.

change should not have an effect on these firms, we would expect the interaction between foreign ownership and the period dummy to have no effect on firms' size constraints. The results support this prediction.

In general, the results from the generalized ordered logit support the prediction in Hypothesis 2. Foreign firms not only are more likely to increase in size but they are also significantly less likely to report as being constrained to be too small. On the other hand, there is no evidence that the probability of firms being larger than optimal has decreased. Taken together, the results suggest that the change in equity policy has helped reduce the size distortion on foreign firms.

6.2 Robustness checks

The previous results are based on the definition of foreign firms as firms owned by 30 percent or more by foreigners. This is the standard definition of foreign ownership in the literature. However, the rationale also rests in the fact that for firms that already have less than 30 percent foreign ownership, i.e. they already have more than 70 percent domestic shareholders, restructuring is less likely to be an issue. Nevertheless, I test for whether the results are different if I define all firms with any positive foreign ownership as being "treated". The resulted coefficient and marginal effect estimates on the interaction term from equations (3) and (4) are given in column (1) of table 9. These results correspond to the specifications with the full set of controls, that is, they correspond to column (3) and (2) in tables 6 and 8 respectively. The coefficient and marginal effect estimates on our variable of interest in both equations (3) and (4) are statistically significant and of comparable magnitude as in the estimations using the previous definition of foreign ownership.

Another concern with the previous results is that firms, in particular non-Bumiputera domestic firms, might switch to acquire foreign ownership since only foreign-owned firms are given the policy exemption. If there are other factors that affect employment at these firms differently then I might incorrectly attribute the effects of these changes to the equity policy. To account for this possibility, ideally I would want to model the decisions of firms to change ownership. However, I do not have a good instrument that would affect firm's ownership but not its employment. I choose a simpler approach to check the robustness of my previous results. I define the "treated" group as having foreign ownership in *both* rounds of the survey.

The results when 30 percent shares is used to define foreign ownership are reported in column (2) of table 9. For the regression on log employment, the coefficient estimate on foreign interacted with the period dummy is slightly smaller but still significant. The ordered logit results on firm size constraint are almost unchanged. The results suggest that firms that are at least 30% owned by foreigners are 18% less likely to employment below optimal level and the marginal effects are precisely estimated at 1% level. Next, column (3) shows the estimates when I define the "treated" group as having any positive shares held by foreigners in both survey rounds. The impact of foreign ownership on firm size constraint now becomes slightly smaller but still significant at 1% level. In general, my results are robust to these alternative definitions of foreign ownership.

Finally, I check for whether the results are sensitive to dropping firms which switched industries between the first and second rounds of the survey. Since firms might switch to another industry, for example to take advantage of industry-specific policies, if foreign firms are more likely to switch then my results might be spurious. The results in column (4) are essentially the same as in the full sample, suggesting that this is not the case.

6.3 Alternative explanations

The previous regressions have attempted to control for confounding factors that could be correlated with foreign ownership and affect firm size. However, it is still possible that there are other policies during the same period that target foreign firms and affect their size differently over time. To check for this possibility, I examined Country Reports by the The Economist Intelligent Unit in 2002-2006 for other policy changes during this period.

One potential confounding policy change is the relaxation of rules on employing expatriates in manufacturing, also implemented in June 2003. Faced with labor shortages in certain sectors, the government relaxed its stance on employing highly skilled foreigners and importing foreign laborers (The Economist Intelligent Unit 2004). While this policy could potentially impact all firms, foreign firms might particularly benefit from it if they are more likely to employ skilled workers.

In table 10, I check whether there is evidence that foreign firms employ more foreign workers after the policy change. The percentage of skilled foreign workers in foreign firms actually decreases on average while increasing for domestically owned firms. The simple DID calculation in means is -3.17%. Similarly, the DID in percentage unskilled foreign workers is also negative at -2.97%.

To formally check for the impact of the policy change with respect to expatriate employment, I rerun the regressions in equations (3) and (4) controlling additionally for the firm's percentage of skilled labor in 2001, interacted with the period dummy. If foreign firms are more likely to benefit because they are more likely to need skilled foreign employees then controlling for this interaction term would separate out the impact of this labor policy change from the equity policy. The results with all location and industry FE are reported in table 11. Columns (1) and (2) show the results on log employment and on firm size constraints respectively. While the coefficient estimates on the percentage skilled labor interaction suggests that there might be a positive effect of the labor policy on firm employment, the coefficient estimate on the interaction with foreign ownership are still significant and of similar magnitude as before. The impact of foreign ownership on firm size constraints are also similar to the results not controlling for skilled labor. Therefore, it is unlikely that my results above are confounded with the change in expatriate employment rules.

7 Conclusion

By many standards, affirmative action in Malaysia could be considered a success as it managed to lead to a rapid advancement of the Bumiputera, its designated beneficiary group, in various areas such as education, public sector employment, and asset ownership. In addition, Malaysia was able to avoid of the kind of widespread violence associated with affirmative action found in India and elsewhere (Sowell 2004). However, the myriad of government interventions under the NEP policies have also been widely criticized for creating inefficiencies and discouraging both Chinese and foreign investments. Nevertheless, there has not been much formal empirical evidence on the impact the NEP on businesses.

In this paper, I study one aspect of the pro-Bumiputera policies in the private sector. More specifically, I examine the impact of a policy change which no longer requires foreign-owned manufacturers to set aside 30% of their equity for Malays shareholders once their size passes a certain threshold. I develop a partial equilibrium model to guide empirical predictions on the impact of this change on firm size in term of employment and use data from the Malaysia Productivity and Investment Climate Surveys in 2002 and 2007 to test these predictions. My model shows that there is a range of productivity values where firms would find it too costly to operate above the size threshold and therefore stay below their otherwise optimal size. Given data limitations, I do not analyze the general equilibrium effects of the policy change. Since labor demand changes can affect equilibrium wages, it is not clear how firm size will change for all firms along the whole productivity distribution. In my model, removing the restrictions for foreign firms means that they are less likely to be size constrained. Consequently, the average size of foreign firms also increases accordingly. DID regressions results find evidence supporting these predictions.

Despite the limitations mentioned above, my results indicate that the equity restriction has an effect as a size distortion on firms and relaxing it allows firms to increase their employment to a more efficient size. In recent years, Malaysia has implemented further similar reforms in the service sector as well as with publicly listed companies. Evaluating the impacts of these reforms, particularly their consequences on aggregate productivity, is an interesting and important area for future research.

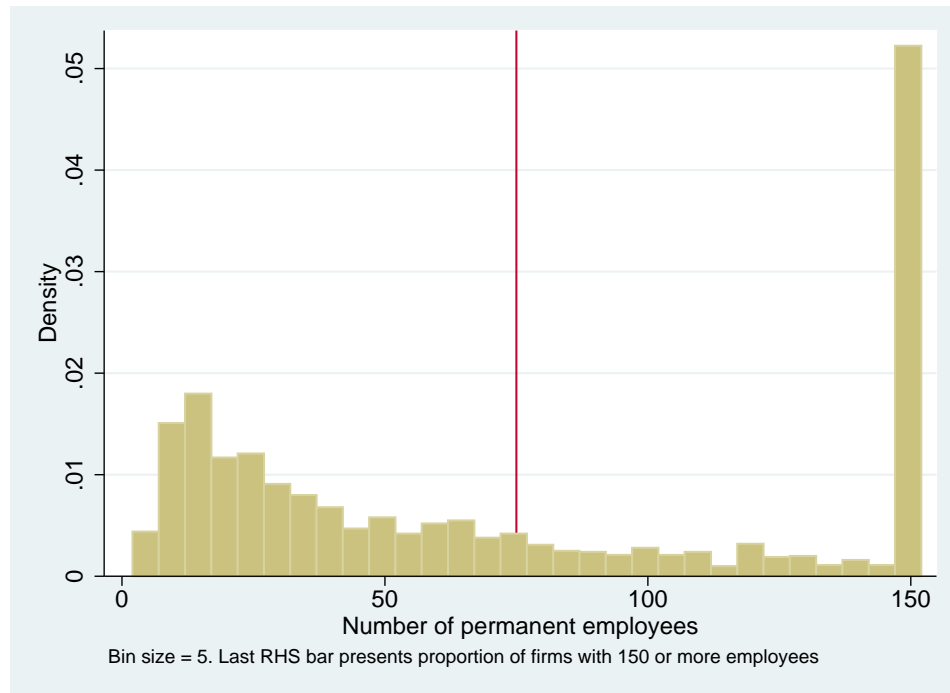
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Figures

Figure 1: Firm size distribution



Tables

Table 1: Sample distribution by industry

Industry	PICS round		Total	Panel obs (non-switchers)	No. of switchers
	1	2			
1. Food Processing	207	243	450	276	3
2. Textiles	30	40	70	28	3
3. Garments	102	90	192	94	4
4. Wood & Wood Products	4	28	32	2	4
5. Chemicals & Chemical Products	33	82	115	40	5
6. Rubber and Plastics	249	281	530	242	11
7. Machinery and Equipment	87	93	180	76	9
8. Office, Accounting & Comp. Machine	0	10	10	0	0
9. Electrical Machinery & Apparatus	0	27	27	0	3
10. Electronics (Equip. & Components)	75	84	159	64	6
11. Motor Vehicles and Parts	38	35	73	32	4
12. Furniture	77	102	179	64	6
Total	902	1,115	2,017	918	58

Table 2: Number of firms by age group

Age group	Number of firms in round		Total	% firms in round	
	1	2		1	2
1 (entering)	2	2	4	0.22	0.18
2 to 5	81	38	119	8.97	3.45
6 to 10	214	154	368	23.70	13.96
10+	605	907	1,512	67.00	82.23

Table 3: Firm ownership by round

Round	1	2	Total
Percentage shares held by foreigners	23.97	22.99	23.43
Percentage shares held by Bumiputera	11.45	10.58	10.96
Percentage shares held by Chinese	57.76	59.60	58.80
Percentage shares held by other domestic owners	6.07	6.80	6.48

Table 4: Summary statistics

Variable	Obs	Mean	S.d	Min	Max
Foreign (foreign shares \geq 30%)	2017	0.28	0.45	0.00	1.00
Age	2003	17.73	11.27	1.00	215.00
Number of permanent workers	2002	180.67	428.90	2.00	6709.00
% firms with \geq 75 workers	2002	41.76	49.33	0.00	100.00
Equity	1938	9215.80	66695.15	-149.61	2103755.00
% firms with equity \geq 2.5 mil RM	1938	31.32	46.39	0.00	100.00
% firms above emp/equity threshold	1964	50.51	50.01	0.00	100.00
Total assets	1919	32922.76	94217.77	11.78	1158128.00
% of total export sales	1968	35.89	40.37	0.00	100.00
Sales	1961	51746.53	156822.30	4.71	1733783.00

Monetary values are in thd RM and deflated using PPI index (2000 as base).

The percentage of firms above equity threshold are calculated using nominal equity

Table 5: Summary statistics for treated and control groups

	Obs		Mean		Difference	p-val
	Domestic	Foreign	Domestic	Foreign		
BEFORE						
Age	644	258	17.404	15.616	-1.787	0.044
Number of permanent workers	640	257	118.517	292.432	173.915	0.000
% firms with more than 75 workers	640	257	31.563	63.813	32.251	0.000
Equity	602	240	8681.205	13390.956	4709.751	0.445
% firms with equity above 2.5 mil RM	602	240	20.100	46.667	26.567	0.000
% firms above emp OR equity threshold	612	248	39.052	75.000	35.948	0.000
Total assets	595	234	21680.810	58925.082	37244.272	0.000
% of total export sales	616	252	25.995	63.044	37.049	0.000
Sales	622	248	25528.236	88577.441	63049.205	0.000
AFTER						
Age	811	290	19.518	18.459	-1.059	0.134
Number of permanent workers	809	296	113.244	402.301	289.057	0.000
% firms with more than 75 workers	809	296	33.869	66.216	32.347	0.000
Equity	800	296	6892.285	13197.573	6305.288	0.084
% firms with equity above 2.5 mil RM	800	296	23.500	62.838	39.338	0.000
% firms above emp OR equity threshold	804	300	40.920	79.333	38.413	0.000
Total assets	796	294	18884.228	72987.662	54103.434	0.000
% of total export sales	805	295	26.831	58.105	31.274	0.000
Sales	802	289	36621.611	118542.003	81920.391	0.000

Table 6: Impact on firm size

Dependent var: ln(employment)	(1)	(2)	(3)	(4)	(5)	(6)
		Full sample			Size in 2001 < 75	
age	0.00357 (0.00266)			-0.00639** (0.00325)		
Foreign	0.381*** (0.0929)	-0.178 (0.119)	-0.268** (0.120)	0.0785 (0.0889)	-0.242** (0.121)	-0.342*** (0.122)
after		0.0965*** (0.0302)			0.158*** (0.0329)	
Foreign × after	0.163 (0.116)	0.0351 (0.0691)	0.187** (0.0857)	0.0456 (0.157)	0.154 (0.113)	0.271* (0.138)
Firm FE		Yes	Yes		Yes	Yes
Industry year FE	Yes		Yes	Yes		Yes
City year FE	Yes		Yes	Yes		Yes
Constant	3.252*** (0.214)	4.047*** (0.0317)	4.443*** (0.433)	3.126*** (0.154)	3.337*** (0.0224)	2.764*** (0.237)
Observations	1672	836	836	713	500	500
R-squared	0.273	0.046	0.380	0.320	0.142	0.573
Number of firms		455	455		271	271

Foreign is a dummy variable denoting 30% or more foreign ownership

Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 7: Reported size constraints in the panel sample

	Size constraint	Round		Total
		1	2	
Foreign owned firms				
	Too small	46	30	76
	Optimal	81	82	163
	Too large	42	47	89
All firms				
	Too small	133	112	245
	Optimal	228	254	482
	Too large	127	122	249

Table 8: Size constraint probabilities (marginal effects reported)

Sample: Dependent variable: size	(1) All firms			(2) Size in 2001 < 75			(3) Size in 2001 >75		
	Too small	Optimal	Too large	Too small	Optimal	Too large	Too small	Optimal	Too large
Ordered logit model									
age	0.0020** (0.00093)	-0.000049 (0.000099)	-0.0020** (0.00090)	0.00098 (0.0015)	-0.000083 (0.00015)	-0.00089 (0.0014)	0.0026** (0.0013)	0.000044 (0.00017)	-0.0027** (0.0013)
Foreign	0.027 (0.032)	-0.0015 (0.0032)	-0.025 (0.029)	0.018 (0.053)	-0.0020 (0.0077)	-0.016 (0.045)	0.036 (0.045)	-0.00053 (0.0031)	-0.035 (0.042)
Foreign × after	-0.045 (0.036)	-0.0033 (0.0067)	0.049 (0.042)	-0.088 (0.056)	-0.015 (0.028)	0.10 (0.083)	-0.041 (0.047)	-0.0038 (0.0085)	0.044 (0.055)
State year FE		Yes			Yes			Yes	
Industry year FE		Yes			Yes			Yes	
Observations	1884	1884	1884	787	787	787	1107	1107	1107
Generalized ordered logit model									
age	0.0018 (0.0012)	0.00020 (0.0010)	-0.0020** (0.00091)	0.0013 (0.0019)	-0.00086 (0.0019)	-0.00047 (0.00099)	0.0021 (0.0015)	0.00083 (0.0014)	-0.0029** (0.0012)
Foreign	0.036 (0.036)	-0.021 (0.040)	-0.014 (0.035)	0.042 (0.061)	-0.045 (0.058)	0.0035 (0.033)	0.045 (0.049)	-0.025 (0.056)	-0.020 (0.048)
Foreign × after	-0.070* (0.041)	0.047 (0.053)	0.023 (0.049)	-0.21*** (0.045)	0.23*** (0.060)	-0.022 (0.049)	-0.044 (0.053)	0.0081 (0.067)	0.036 (0.062)
State year FE		Yes			Yes			Yes	
Industry year FE		Yes			Yes			Yes	
Observations	1884	1884	1884	787	787	787	1107	1107	1107

Dependent variable = (1, 2, 3) if firms' self reported size is too small, optimal and too large.

The generalized ordered logit model is estimated using the gologit2 command in Stata (Williams 2006).

Marginal effects reported. Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table 9: Robustness checks

Eqn	Dependent variable	Alternative definitions of foreign			Same industry
		(1)	(2)	(3)	(4)
(3)	ln(employment)	0.198** (0.0829)	0.149* (0.0833)	0.158** (0.0780)	0.176** (0.0874)
	Sample size	846	846	846	788
(4)	Size too small	-0.175*** (0.0528)	-0.176*** (0.0655)	-0.158*** (0.0582)	-0.217*** (0.0490)
	Size optimal	0.219*** (0.0579)	0.195** (0.0804)	0.151* (0.0782)	0.247*** (0.0630)
	Size too large	-0.0439	-0.0187	0.00689	-0.0304
	Sample size	802	802	802	763

Eqn (3): coefficient estimates on (foreign \times after), from the spec in column (3) of Table 6

Eqn (4): Marginal effects on (foreign \times after), from the spec in column (2) of Tables 8

Column (1): foreign is defined as having positive shares by foreigners

Column (2): foreign is defined as having 30 or more shares by foreigners both 2001 & 2006

Column (3): foreign is defined as having positive shares by foreigners in both 2001 & 2006

Column (4): firms that switched industries between 2 rounds are dropped from the sample

Table 10: Percentage of permanent workers of foreign nationals

		Before	After
Skilled	Domestic	10.94	12.23
	Foreign	10.61	8.73
	DID	-3.17	
Unskilled	Domestic	16.62	27.95
	Foreign	15.23	23.58
	DID	-2.97	

Table 11: Alternative explanations

Dependent variable	(1)	(2)		
	ln(emp)	Too small	Optimal	Too large
age		0.00154 (0.00190)	-0.00122 (0.00184)	-0.000319 (0.000966)
Foreign	-0.249** (0.119)	0.0427 (0.0614)	-0.0468 (0.0586)	0.00416 (0.0322)
Foreign × after	0.189** (0.0851)	-0.199*** (0.0480)	0.214*** (0.0629)	-0.0155 (0.0509)
% skilled labor in 2001 × after	0.207* (0.110)	-0.145 (0.0973)	0.290*** (0.0926)	-0.145*** (0.0538)
Constant	4.641*** (0.401)			
Firm FE	Yes			
Industry year FE	Yes			
City year FE	Yes			
Industry year FE			Yes	
State year FE			Yes	
Observations	836	787	787	787
R-squared	0.388			
Number of firms	455			

Clustered standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Column (1): linear regression on log employment with firm FE

Column (2): generalized ordered logit regression, mar. eff. reported, sample: size in 2001 < 75