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Abstract

Large scale business subsidies tied to national industrial development promotion pro-grams are notoriously difficult to study and inseparable from the political economy aspect of large government programs. The Tunisian Industrial Upgrading Program, initiated in the late 80's, to improve the competitiveness of Tunisian firms increasingly exposed to international competition through firm subsidies, is such an example. The continuation and resurgence of industrial devlopment programs, such as the Tunisian IUP, makes the rigorous evaluation of this type of program within the political economy framework, increasingly important. We use the Tunisian national firm registry database and a perceptions' survey administered by the national research institute to measure the impact of the IUP and its beneficiaries. Using inverse propensity score re-weighted differences-in-differences regressions, we find that when program recipients are large firms, gains of the program are mostly retained by capital-owners, while when subsidies are distributed to small-sized firms, more gains go to labor.

Keywords: Business taxes and subsidies, firm, political economy, firm performance: size, diversification, and scope, microeconomic analyses of economic development, industrial policy, Africa.

JEL Classifications: H25, H32, P16, L25, O12, O25, O55.

1 Introduction

Industrial policies have long lost favor in light of difficulties in the effectiveness and political economy of structural adjustment programs. The unpopularity of industrial policies grew from its capacity to produce and exacerbate market distortions, as well as the fear of political capture of subsidies in developing countries (Rodrik, 2008). However, in a development context, there is little to differentiate the failures of these types of policies with the failures in long entrenched and accepted "horizontal" industrial policies, such as those that subsidize education or health services. Despite concerns and common pitfalls, "vertical" industrial policy still remains a common intervention for governments. In particular, they are used to stimulate growth after economy-wide or sector specific recessions and as part of employment and regional development policy. [1] In Tunisia, one such policy, the Tunisian Industrial Upgrading Program, aimed at improving sectors increasingly exposed to competition from external markets, was implemented in the late 80's and 90's and still exists today. It provides a package of subsidies and in-kind technical support to help firms operating within the manufacturing sector and services related to manufacturing increase competitiveness of Tunisian firms.

Industrial development policies at various stages of development may serve different purposes, but they are inseparable from the incentives driven of the private sector. Cammett (2007) argues that state-led industrial policies can be successful at initial stages of development and on the long-run, like in the case of the South Korean model. Nevertheless, governments often lack the a supportive political-economy context and *will* to implement the type of policy reform needed to transition to the next phases of structural change. Implementing such reforms becomes even more difficult when there are close ties between businesses and the state. For large scale industrial policies to be successful, one would also need to align incentives for politicians and for stakeholders in the private sector. For such programs to support small and non-connected firms, incentives for firms close to the state would have to be aligned with those in purely competitive markets.

In the authoritarian regimes, such as in some of the countries of the Middle-East and North Africa, Rougier (2016) argues that the weak demand for change is due to the state dominance of the private sector. Malik and Awadallah (2013) argues that these regimes can not accept the emergence of a private sector generating its income independently from rents controlled by the State. Rijkers et al. (2017) have shown that the state guarantees its clients a non-competitive environment and endogenous regulation protecting their interests. It is therefore not surprising that in the context of Tunisia and the Industrial Upgrading Program, Murphy (2006) finds that even if the IUP may have been successful on some fronts, it is essentially an extension of arm of the state in ensuring political stability.

Some of the literature on firm-subsidies shows positive outcomes for firms in terms of jobs and output (Criscuolo et al., 2012; Bernini et al., 2017; Einiö, 2014), while others show no

[1] Authors have frequently referred to industrial policies as either "horizontal" and "vertical". "Horizontal" policies can impact all sectors, and do not necessarily have a sector specific component. Nevertheless, they can impact some sectors differently than others. For example, the protection of business and labor interest groups, access to lower interest rates or education, training or health-related policies are "horizontal" industrial policies. "Horizontal" policies such as training and education are not "sector - blind." They may be economy-wide, but impact some sectors more than others. For example, focusing on technical computer skills training will not help manufacturing production lines as much as it will provide skilled labor for services. On the other hand, "Vertical" industrial policies have a sector-specific or firm-specific component and can target entire sectors, or firms within sectors. This can include, for example, policies specifically for tradable sectors, or business subsidies or interest rate reductions targeting one type of sector or economic activity. In the context of developing countries, political capture occurs as frequently in the basic social welfare, or "horizontal" policies as in business subsidies and "vertical" policies. We adopt this definition and approach, and refrain our paper to "vertical" industrial policies targeting mostly the manufacturing sector, and services related to manufacturing.

impact (Wallsten, 2000) on jobs. At the same time, some papers find evidence that total factor productivity is not impacted (Criscuolo et al., 2012), or negatively impacted in the short-run (Bernini et al., 2017). When there is a positive effect on productivity it takes a few years to materialize (Einiö, 2014). In regards to investments, there are even fewer studies available, but those that exist have opposing findings. Wallsten (2000) finds that subsidies crowd-out investments, while Einiö (2014) finds no evidence of crowding out. For all studies, it is evident that selection bias impacts firms behaviours before and during the treatment period (Bernini et al., 2017; Criscuolo et al., 2012; Wallsten, 2000). Finally, the type of subsidy or grant received may impact how firms react. In a comparative paper Hottenrott et al. (2017) investigate different types of subsidies and find that research grants are effective in stimulating research expenditures and development, while development subsidies do not seem to impact development expenditures.

In a context of the recently documented close business-state relations in Tunisia and standard principal-agent theory, if, as previous authors suggest, the "principal" in Tunisia is indeed the state extending its arm through business elite, then we should expect more benefits to accumulate to capital than labor. Alternatively, if the "principal" is ultimately labor, and the state is acting through the private sector to serve the principal, then there should be more gains to labor than to capital. A rigorous evaluation of the impact of this program can bring insights both on the effectiveness of this program as well as insight into its political economy implications of industrial policies that provide subsidies to firms.

Our article is the first rigorous evaluation of an industrial policy in the Middle-East and North Africa and one among rare examples in developing countries. This work is relevant both to academics and to policy makers looking to better target state interventions. Until now, there has been very limited research focusing on the impact of firm-subsidies as a part of a larger industrial program in the context of development countries, and limited research linking these programs with the political economy of the country. Secondly, our paper adapts an innovative evaluation methodology to accommodate for restrictive administrative burdens in the evaluation of such an intervention. We provide an example of how to use intention-to-treat method where tight administrative restrictions may hinder more robust academic research. While this study could have been conducted in other countries implementing large scale industrial policies, because the quality of administrative data on firms in Tunisia is relatively high, it allows researchers to study the impact of firm-targeted industrial policy programs.

The methodology of our paper follows Cadot et al. (2015) and Hirano et al. (2003), who use a weighted propensity score matching method to create control groups and extended the analysis with a time-series differences-in-differences and various firm, year, sector, regional, age and fund-related controls. This combination allows us to conduct a program evaluation analysis focusing on intention-to-treat effects using the national firms census and a survey on treated firms. To create control and treatment groups, the treated firms are identified on observable characteristics that vary by size, region, trade status, and industry on a yearly basis, while those in control groups are matched on different years, regions, industries and prior performance. Weights were then applied to account for measurement error in the identification stage, and inverse-propensity scores were used in the final reduced form specification to capture weighed treatment effects.

Using an inverse propensity score weighting procedure on a time-series differences-in-difference model for all formal firms in targeted sectors (manufacturing and to some extent services), we observe first level and final results on several key indicators of performance for

the IUP. Globally, first-level average treatment effects[2] suggested that the program resulted in increased employment, and firm survival, but had no impact on profitability and net job creation, or exports. However, having been treated resulted in lowered average wages, and turnover per worker. These initial findings depict gains for employment, but losses for those in terms of wages, and no real gains in profitability. Extending the analysis to the inversely-weighted model shows that most of the gains in employment were through firms receiving more intense treatment. Wages remained unaffected, even in periods of increased labor. The only exception was in the third year where wages dropped significantly, and concurrently with turnover per worker. This suggests diminishing returns to subsidies consistent with prior research. Lastly, impacts on firm survival suggest that the program only did not necessarily increase survival rates, but only stopped firms from death in the treatment and early years. The negative firm survival estimates in the first year suggest that firms that needed help to survive were treated, however, many of them failed in the first year, and among those that remained, many of them failed in the third year. More intensely treated firms did not fail in the third year.

On a more disaggregate level, there are heterogeneous outcomes across firms characteristics. For small firms, there was some evidence of profit sharing between capital and labor, where as in larger firms, profits were retained by capital owners. There is some evidence that small and large firms increased in net job creation and employment, but the source of the increase seems to be due to increases in turnover per worker in the previous year for small firms, and overall profits for large firms. Suggesting that workers may be the drivers of re-distributive productivity for smaller firms, but not for larger firms. There is low to no evidence of wage growth for any firms, but significant drops in wages for medium-sized and very large firms. In fact, a decrease in wages is observed mostly in medium-to-large, very large and descriptively, from mega firms. Capital retained profits from the program in med-large and very-large firms and profitability increased while wages decreased. Suggesting that owners of capital observed higher gains than owners of labor in med-large and very-large firms.

The rest of the paper i.) describes the Tunisian upgrading program ; ii.) provides a data description; iii.) proposes an identification strategy and econometric approach; iv.) discusses descriptive analysis and regression results; and finally v.) discusses the results within the political economy context of Tunisia.

2 The Tunisian Industrial Upgrading Program (IUP)

The Tunisian Industrial Upgrading Program (IUP) implemented in anticipation of full entry into the the Free Trade Agreement with the European Union, is a "vertical" industrial policy program aimed to increase competitiveness, exports, innovation and labor market outcomes. It was initially aimed at bringing the competitiveness of firms to a comparable level with European and Chinese firms before the reduction of trade barriers through the EU free trade agreements. At the time of entering the Free Trade Agreement, Tunisia requested additional time to protect firms as they caught up with other countries' levels of competitiveness. They also ask for additional financial assistance to support structural adjustment. Although the business community claims to have requested the IUP, the program initially started with financial support from the European Union (EU Structural Adjustment Facility) and loans from the European Investment Bank (EIB) (Murphy, 2006). The IUP was initially limited to the manufacturing sector. However, in 1997 services with high links to manufacturing were added to the list of

[2]There refer to the simple propensity score matching results

beneficiary sectors. More than five thousand grants have been distributed in the last twenty years, corresponding to a total amount of 1260 million Dinar (around 500 million US$). Two thirds of the amount were spent on material purchases and the rest on immaterial acquisitions (Ben Khalifa, 2017).

The main reasons for the implementation of the IUP were two-fold. There was an economic logic as well as a political logic. Cammett (2007) finds that the dismantling of the Multi-fiber Agreement for textiles and competition from China led the Tunisian government and business elite to focus becoming economically prepared to compete in world markets by directing efforts to transform the Tunisian economy into producing higher value-added manufacturing exports, with increased efficiency and reduced market access frictions. She further argues that from a political stand-point, clientelism in Tunisia helped make the implementation of such a program possible. In the same line of argument, Murphy (2006) found that the IUP eventually served to further entrench the role of the state in intervening and controlling the private sector and civil society organizations. Murphy's assessment found that non-transparent, low-oversight method of implementing the program through closed-door meetings within the newly establish *bureau de mise à niveau* and the multi-stakeholder financing board (COPIL) further exasperated the concerns among civil society and the major donors that funded the program. It quickly became a widely know fact that many of the family members of the inner circle of regime benefited from the IUP. She argues that the government used early reforms to muster government support and subvert the rise of civil society demands for further reforms.

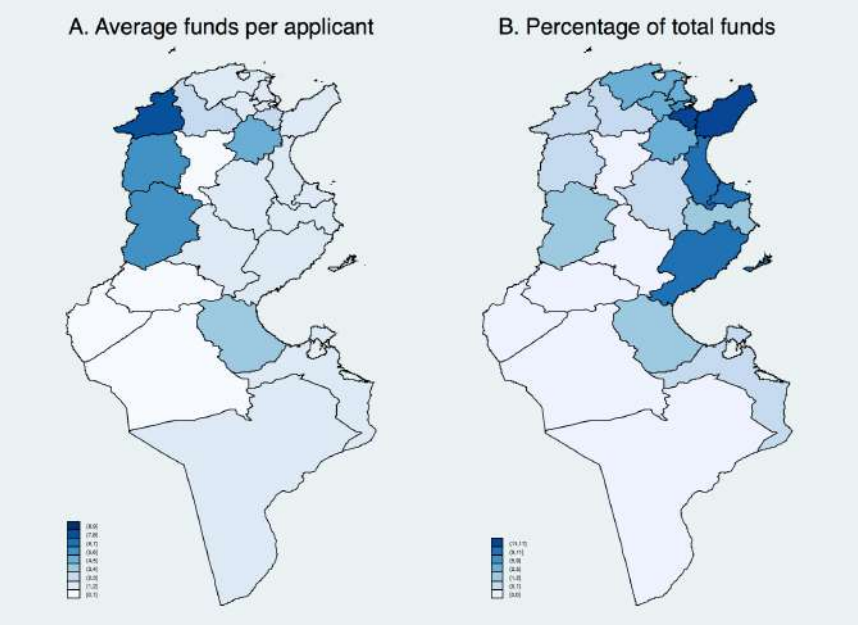
To qualify for the IUP, firms need at least 2 years of incorporation and critically, they need to belong to eligible industries which include the following: agriculture and food; construction, ceramics and glass; chemicals; textiles, clothing and leather; mechanical, metal and electrical work; and those classified as diverse industries such as services related to these activities. Inherently, it also required firms to be in the formal market and that firm fiscal accounts were up-to-date and legible by the selection committee. According to Murphy (2006), firms wishing to benefit from the program made an initial application that responded to a set of principles and objectives, rather than a standard application form. If accepted they were asked to provide a strategic and financial diagnostics. Technical support was then provided by either Technical Centers, the *Agence de Promotion de l'Industrie* for public-private partnerships, or private firms. [3]

In terms of successful application rates and regional distribution, most firms that applied received funding./footnoteThe fact that firms had to apply to receive funding also meant that there is implicit selection bias before firms applied, as firms who applied likely have different observable and non-observable characteristics from those who did not. The average funds per applicant[4] was higher in the north eastern region (1, Panel A and Figure 7, Panel C). However, in the last 20 years (1996-mid 2017), the distribution of total funds for the IUP has been largely concentrated in the northern coastal regions (Figure 1 Panel B and Figure 7, Panels A (weighted) in Annex). Over the entire period of funding, 17% of total funds for the IUP went to the region of Ben Arous. The region of Nabeul received 13% of all funds, and the regions of Monastir, Sfax and Sousse each received 11% of the total funding pool. The relatively higher approval-to-applicant ratio in the north and eastern coasts (Figure 7 Panel D) was also reflected in the fact that less firms applied in those regions (Figure 7, Panel B).[5]

Although financed by the Government budget and many donors, a quantitative assessment

[3] Further information on selection criteria was unfortunately not available for the purposes of this research.
[4] Average funds per applicant are weighed by total applicants per region.
[5] This was weighted by total applicants per region.

Figure 1: Distribution of IUP funds by region



Source: Bureau de Mise à Niveau

Note: Rates are weighed by total applicants per region. Total and average funds are in current millions of Tunisian Dinars.

of this program incorporating key economic performance data was never undertaken. However, a survey of firms' perceptions was recently implemented and its results were analyzed by the institute of economic studies of the Ministry of Development (ITCEQ) and made available after our request for research purposes. The qualitative survey in 2016 was used by Ben Khalifa (2017) to assess the impact of the IUP on the adoption of information and telecommunication technologies. The main conclusion through ITCEQ that the IUP has a positive impact on exporting firms, located in coastal areas, and for small or medium sized firms.

3 Data Description

Main Data Sources Description The data used in this paper come from 2 main sources. The first source is from the national firm-level enterprise registry (*Répertoire nationale des entreprises*, RNE) administered by the national statistical institute (*l'Institut national de la statistique*, INS). It includes data for all formal firms, over the span of 17 years from 2000 to 2016. This resource is the most exhaustive source for firm-level data in Tunisia. The database is linked with business turnover, profits and firm-level employment data from the Ministry of Finance. It was also possible to link the data directly with the national export-import customs database including export values and quantities on the HS6 product level and by country (for years 2005 to 2010).

For our purposes, we use a sub-sample of firms that had at least 6 employees in at least in one period in the database. The reason for restriction on firm size of at least 6 in any of the years, is two-fold. First, the quality of the data collected for firms with less than 6 employees is low. Secondly, and more importantly, only firms with 6 or more employees are required to file taxes and can benefit from government subsidies and tax breaks. This subset therefore implicitly reduces differences in non-observables. Because we do not directly observe selection

criteria for other government benefits, we at least know that these characteristics satisfy explicit and at least some implicit requirements for becoming a beneficiary of the industrial upgrading program, as well as any other program. Furthermore, in the same line of thought, we only apply the analysis to firms that officially qualify to recieve funding in the following two ways : 1.) by belonging within the eligible manufacturing and services sectors, and 2.) who at some year during the panel, were at least 2 years old. After our identification strategy successfully captured firms in the intention-to-treat group, we used a random sample of firms to draw from as the control group.

The second main source for our analysis is a questionnaire administered to executive members of treated and identified control firms in Tunisia by ITCEQ (*Institut tunisien de la compétitivité et des études quantitatives*). This provides qualitative perception-based information for a one-year period. The identification of selected firms within the treatment and control groups was conducted internally in the ITCEQ offices. The survey was administered using the same stratification methods as the data collected from the national statistical institute and gathered perceptions of the impact of firms. It includes information from 140 treated firms and 98 non-treated firms that were matched using inverse-propensity score matching on observable firm criteria. Unfortunately, ITCEQ reported difficulties in following up with some firms and therefore there is a slight attrition bias (less that 10% in the data and not possibility to combine with our main data set from the RNE due to administrative barriers and authorization requirements.

4 Identification Strategy and Econometric Approach

Identification of Treated Firms We faced informational and technical barriers in accessing program identification information and tax payer id numbers to match treatment with the national business registry data. Although recent laws were passed ensuring access to program related information for research purposes, not all ministries were equally cooperative for academic research. Therefore, part of the barriers to conducting a direct matching were administrative, while others technical. To address these concerns, we took an approach that most closely resembles an intention-to-treat design. While the administrative restrictions to merging treatment data by fiscal identification numbers was a set back, it gave us the opportunity to try more innovative identification strategies. We can consider the resulting ITT effects as a lower bound of the average treatment effect since several identified firms in the treatment group may have not been treated in reality Chakravarty et al. (2019).

While we were not able to use the exact identifiers, we merged program information with firm-level information on treated firms based on size, sector, locality and exporter status on a yearly basis. To be cautious, we used ranges to identify size of firms. For instance, a firm with 6-9 employees, localized in Ben Arous, that is an exporter and that makes shoes in 2004 is identified in a block treatment group (or strata) with all other firms with the same characteristics. In terms of treatment information, the year of treatment reflects the first year of treatment, but no program information is known about the year of subsequent treatments, nor the length of treatment. In total, the treatment identifiers contained 128 sectors, ranging from small to large firms with different export activities totalling to with 2500 such combinations across the span of years 2005 to 2011. Within identification blocks, there are firms that received more than one treatment and blocks with multiple firms assigned. We could increase the accuracy of assignment by using the exact number of employees, but this would require the strong practical assumption that the data gathered on treatment and the data gathered (or submitted) from the Ministry of

economy is consistent and reported without error within the same reference period. Because small firms and larger firms have different velocities of labor turnover over different reporting periods, we created employment groupings to reflect the a degree of acceptable variation in employee turnover. While not a perfect approach, in accepting this method and the associated downward bias that reduces accuracy of estimates, we save ourselves from the more likely occurrence of measurement error associated with administrative reporting requirements that would confound our treatment estimation.

The resulting "blocks" or stratas of treatment therefore capture an intention-to-treat that is implicitly a result of the internal (and opaque) selection process of the offices of the industrial upgrading program. The treated groups are then weighed by the number of treatments and number of treated firms within the universe of each block (or strata). For example, if there were 2 firms that had the same characteristics and were identified, their group was assigned a weight of 0.5. After sensitivity tests, the identified firms kept only included stratas where we were reasonably sure of the identification. We measured how "sure" we were of treatment by ranking the weights and selecting only those above the median level of sureness. Because some firms where treated multiple times treatment the identified firms that we keep in the regression have weights ranging from 1 to 7. In the sample we dropped, the range for weights within groups were from 0.2 to 1.[6] This is the first instance of weighting that appears in the regression. Without exact information on the process of selection for those who satisfied eligibility requirements, we believed this to be the more relevant identification strategy for the use of this database. Furthermore, additional sensitivity and robustness tests in further sections below suggest that our estimates are lower bound estimates and that the dilution of our treatment variable is only causing attenuation bias (regression dilution caused by random noise) as manually inducing errors-in-variables even by marginal amounts (5 and 10%) results in non-significant outcomes (Annex Figure 5).

Econometric Approach This paper's approach is to find a more precise effect of the program through several regression techniques. In the process of testing and revisions, the techniques included an OLS fixed effects regression, matching, estimation adjustments through bootstrapping and double robust methods[7], a dynamic panel model that keeps firms matched to their first year partners, and finally an inverse propensity matching re-weighted regression. [8] [9] We then use the pooled approach to generate the inverse propensity scores used to re-weight the differences-in-differences regression (IPRDID) as in Hirano et al. (2003) and Cadot et al. (2015). Unlike previous papers, we also need to account for weighting within treatment blocks. For this purpose we introduce a double weighting method that accounts for both the propensity of matching firms and the weight of treated firms within selected intention-to-treat groups.

Our econometric specification on the outcomes of interest is as follows:

$$y_{i,t} = \beta_0 + \beta_1 Treated * After_{i,t} + \beta_2 TreatmentGroup_i + \beta_3 X'_{i,t}\gamma + \tau_t + \lambda_i + \zeta_i + \epsilon_i \quad (1)$$

[6]Thanks to Bob Rijkers for suggesting this sensitivity test, and subsequent adaption. We ranked all the weights by distribution. At the 18th percentile, all stratas showed at least a one to one match. In testing the sensitivity of our choice of "level of sureness" we increased the level of stringency until we reached a limit after which our betas were no longer stable.

[7]Double-robust post-estimation regression-adjustment is an additional procedures that corrects bias in the standard errors when either the propensity score model or the regression model is incorrectly specified

[8]The first matching method is a pooled Mahalanobis matching procedure with Epanechnikov kernel density. Additional bootstrapping and double-robust regression did not change estimates, and had a marginal impact on standard errors. These are not reported here, but did not cause alarm in regards to estimates.

[9]The heavy process requirements of the dynamic panel model unfortunately did not run on the in-house database at the INS, although for additional analysis, taking this approach may be interesting.

where the main outcome variable of interest, $y_{i,t}$ is firm-level outcomes such as employment, trade and business outcomes.[10] β_1 captures the interaction term that is our main variable of interest, while β_2 captures the change of the main outcome variable associated with belonging to the treated group. β_3 captures the impact of a series of control variables including lags of the main variable of interest as well as components of the production function. We apply year (τ_t), regional (λ_i), and sector (ζ_i) fixed effects as well as controls on age, size, funds allocated (on a regional level) and distance to ports. Additionally, to control for non-linear time trends prior to treatment, we include the first and second lags plus averages of past 2-4 years of variables for analysis on the larger sample. All outcome and control variables are measured in logs of shares using the log + 1 transformation except for firm survival which is in log + 1 transformation. [11]

5 Descriptive Analysis and Results

5.1 Outcomes from Perception Survey

Through the ITCEQ survey we are able to understand reported perceptions and expectations of eligible firms that participated in the IUP and compare them with a group of control firms (Figure 2 and Figure 8). The purpose of the IUP was to increase competitiveness of firms by improving productivity. At the macroeconomic level, policy-makers hoped to increase employment outcomes, and competitiveness of firms. The IUP survey found that in comparison to non-treated firms, treated firms *reported* higher current revenue, similar current exports, and lower employment in previous years.

Treated firms expected higher employment, revenue and income from exports than the control group. While exports increased for treated firms in the years leading up to the survey, they did not report increasing employment or revenues in all previous years. In terms of employment, roughly the same amount of treated and non-treated firms reported an increase in employment in 2014. However, in 2015, 9.6% more control firms (than non-treated firms) reported an increase in employment. On the other hand, the *expected* projection of employment needs is 12.8% higher for treated firms than non-treated firms. In terms of revenue, non treated firms reported having increases in revenue (5.1%) in 2014, but in 2015 the increases in revenues was roughly equal between the two groups. Over the next 3 years, 14.4% of treated firms reported expecting increases in revenue. In terms of exports, treated firms reported growing trends, while the trend for exports are decreasing for the control group.

Treated firms reported expecting to increase investments (Figure 9). The type of investments expected by treated firms differ from those in the control group. Treated firms expect to increase overall investment, including both material and immaterial investments, while fewer control firms reported expected increases in overall investment. Approximately half of control firms reported expecting an increase in investment, while over 60% of treated firms reported expecting increases in investments. Within these groups, firms belonging to control groups expected higher material investment, whereas more firms belonging to treated groups expected immaterial investments. While it is not possible to decompose total investment by origin within the ITCEQ survey, the channelling off some of the funding available through the program to increase immaterial investment, suggests that the IUP could have had a substitution effect rather

[10] All variables are calculated in logs of shares +1 except for firm survival and number of products or markets.

[11] Furthermore, like Rijkers et al. (2017), instead of direct labor productivity that is missing due to the a lack of value-added variables, we use a proxy for labor productivity by looking at business turnover over full-time equivalent employment.

Figure 2: Reported Increases in Employment, Revenue and Export outcomes

Source: ITCEQ

Note: Figure reports percentage of firms reporting any type of increase of each outcome.

than a complementary effect on firm investments. Unfortunately, without further information on capital and investment on a firm level, we cannot investigate this trend.

In general, treated firms believed they were more competitive after treatment. The perceptions of the relative competitiveness of post-treatment output from treated firms were positive. Treated firms reported a larger change in increased perception of competitiveness with current competitors, and clients who were searching for more competitive goods and services. They reported having observed the most improvements in product quality, and increased self-reported productivity, organization and culture, ICT and human resources (Figure 10 in the Appendix).

We also see some evidence of increased innovation and quality of output. Treated firms reported using more innovative technology, communications infrastructure, and automated technologies in the workplace than non-treated firms (Figure 11 and 12 in the Appendix). For treated firms, the largest inter-firm innovations came from innovations in process, in product, to a lesser degree innovations in firm organization and to the lowest degree, to marketing. Across the board there was close to a fifth more treated firm reported innovations in product, process, organization and marketing than control firms. In terms of tangible aspects of innovation, 10% more treated firms reported registering trademarks and filing patents or licenses. Remarkably, there was a approximately 30% more treated firms that reported filing for ISO 9001 certificates, an international standard that measures the quality of products, than firms in control groups.

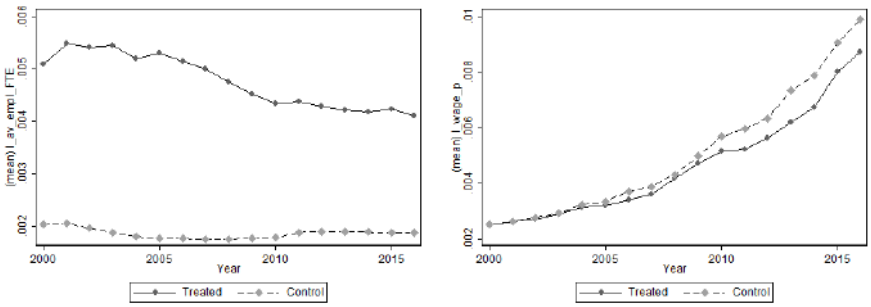
5.2 Descriptive and Regression Analysis

By the description provided of the selection process of the program, endogeneity of treatment was already highly likely. Furthermore, given the dynamic treatment of firms, a convincing differences-in-differences trend would not easily be observable. Furthermore, simple graphical analysis of potentially treated firms and "always control" firms trends demonstrated volatility around the period of the crisis and heterogeneity between treatment groups over the years.

The descriptive data suggests that firms that the treatment group does not consistently distribute gains to labor. Firms that were never treated had lower average full-time employment, but remained on average around the same values, while firms in the treated group had twice

as many employees, but its average number of employees decreased over time (Figure 3). Furthermore, wages grew for both treatment and control groups, but great faster for the control groups. Treated firms under-performed control firms in changes related to both employment and labor.

Figure 3: Trends for Employment and Wages

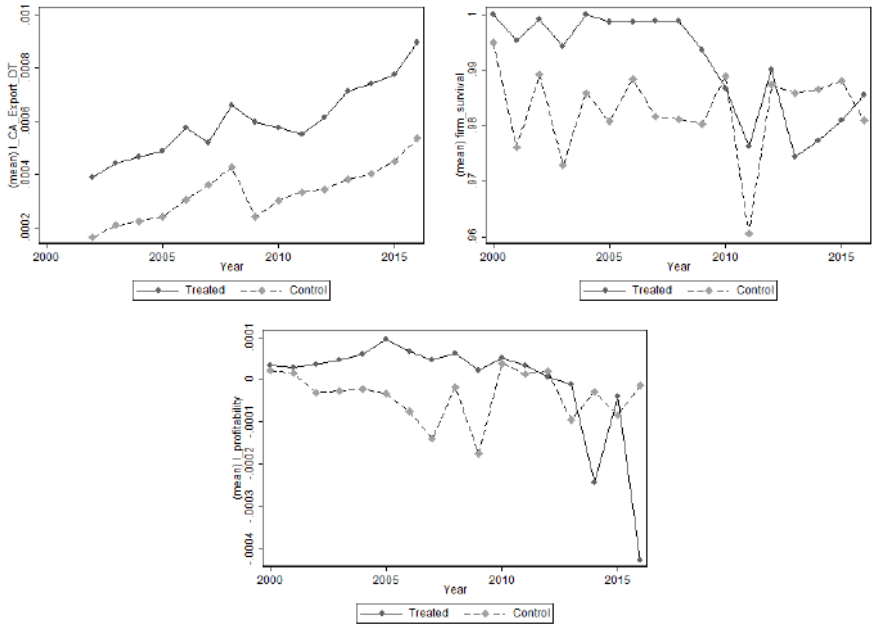


Source: RNE

Gains in the treatment group are still observed by firm and capital owners in part due to longer survival and profitability (for most of the period) and higher exports (Figure 4). The treatment group has higher survival rates in the period before the crisis and higher levels of exports than control firms. It is remarkable to note that firm survival rates of treated firms dropped substantially from pre to post the jasmine revolution period (2011) and have not recovered, where as the control group observed large drops but recovered a year later. Exports did not change much during the revolution, but they did become volatile during the global financial crisis. During the GFC, exports suffered more heavily for the control group than the treated group. Likewise, profitability dropped for both groups during the global financial crisis year, but more markedly for the control group. Furthermore, like the trend in firm survival, profitability decreased for treated firms in 2011 and continued to decrease, while profitability stabilized for the control group. Trends in exports, firm survival and profitability suggest that treated firms had better outcomes in particular in the pre-crisis periods, but were more volatile to political unrest and the global financial crisis. Trends in exports for the treatment group consistently remained above the non-treated group in the entire period.

Matching performance and average treatment effects. Propensity scores were estimated using a Logit model where variables were matched on all key characteristics of firms available in the database including information on size group, restrictiveness, firm origin (foreign or national), firm type (public or private), year, sector, age, age-squared, coastal (regions by the coast), export intensiveness, distance to ports and the average distance to the closest two ports. In addition, we included the second lags and average of the 2-4 year lags of employment, total wages, profits, turnover, total export value, export values per unit that accounts for previous

Figure 4: Trends for Firm Survival and Exports



Source: RNE

trends in key variables and avoids direct temporal endogeneity. [12] [14] The resulting propensity score measured the average treatment effects of the intention-to-treat group and dropped observations that did not fit in the common support range of propensity scores. [15]

Ignorability of matched assignments given observable characteristics may still be a concern, however, given that matching outcomes were not the final results of our regression, we had the opportunity to apply additional variables in a second stage that could control for additional selection on observables and inherent unobservables. [16] Each outcome variable was assigned its own propensity score and treated and control groups. The graphical results of the matching procedure based on several outcomes is presented in the Annex Figures 13 and Figure 14. After the removal of firms outside the common support, there were approximately 1300 to 1400 treated observations in the common support range, and between 21000 and 23000 observations in the control group that were in the common support range (see Table 6). In some cases the matching algorithm performed relatively well, reducing bias below 25%, while in others the

[12] To start the causal analysis, we applied a variety of matching methods starting with the simplest matching algorithm and extending it to tighter restrictions. Following this, we tested if the performance of the matching improved using Rosenbaum tests, and observed the density plots of propensity scores for treated and control groups (Annex Figures 13 and 14). Among the methods used, we applied a strict dynamic Mahalanobis matching, one-to-one nearest-neighbor matching and Kernel matching procedures with various size of calipers. Observing covariate matching and an analysis of Rosenbaum bounds on matching estimators provided guidance on the selection of matching procedures. In consideration of the marginal changes and the limited improvements of matching using more complicated procedures, we pursued a matching algorithm with a caliper of 1, restricted to the common support area, that uses the Abadie and Imbens (2006) standard errors with conditional covariances calculated using 2 neighbors.[13] Initial matching procedure with different calipers and a full Mahalanobis-metric matching reduced matching bias in approximately the same amount but was heavier in computational power.

[14] Distance to ports variables were estimated using geographical distances from GPS coordinates of the city where firms were located to the GPS coordinate of all current ports in Tunisia. Using the average of two ports establishes some degree of stability of access to ports and other markets in case of recent developments in port expansions.

[15] We chose against using a dynamic replacement model both for computational limitations and because we want to prioritize consistently estimating the closest matching propensities within the regressions.

[16] In future analysis with this type of database, a dynamic matching algorithm with no-replacement would be the method of choice, but due to computational limitations, we could not proceed with this method. Furthermore, exploring more powerful computational methods may lead to more precise matching metrics.

Table 1: Treatment effects of IUP on key program variables

	Propensity Score Matching - Average Treatment Effects			
	Employment	Wages	Profitability	Net Job Creation
PSM ATE	**0.001416*****	**-0.001355*****	0.000059	-0.000087
	[3.296]	[-8.369]	[0.728]	[-0.373]
	Turnover	Turnover/L	Firm Survival	Exports
PSM ATE	**-0.000724*****	**-0.000076*****	**0.006581****	-0.000499
	[-3.298]	[-4.003]	[1.995]	[-1.498]

bias was still slightly over recommended levels while recommended covariance balances were all within standard acceptable levels (Figure 7).

The results of the first-level of our analysis is presented in Table 1. The average treatment effect of the IUP demonstrated that firms who were in the intention-to-treat treatment group on average increased employment and firm survival over the entire period. However, wages dropped as did turnover and turnover per worker. There were no measurable and statistically significant impacts on profitability, net job creation or exports. The initial findings suggest that while average employment increased due to the program, wages did not. Furthermore gains in employment where not consistent with changes in turnover, but rather with firm survival. Initially these results suggest that the program is beneficial for labor in terms of jobs, but not in terms of job quality. While firms maybe lasting longer, it is unclear that this is a logical outcome of competitive markets as turnover and turnover per worker is actually falling, while exports and profitability is not rising.

Given that the matching exercise increased the credibility of our results over a standard differences and differences model, these results should be more credible than a direct comparison between groups, before and after dynamic treatment. We gather individual matching propensity scores for each variable of interest. As reported in the matching performance table in the Annex Table 7, some variables were better matched than others and there still remained some bias in the results after matching.

5.2.1 Baseline Results

The inverse propensity weighted and double weighted inverse propensity differences-in-differences results for the first 3 years after treatment are reported in Table 2. Here we present results that restrict our sample to treated firms with the highest intensity of treatment.[17] Like the ITCEQ perceptions survey, the estimates show evidence of employment growth for the firms within the intention-to -treat group (IPW1), but this disappears when weighing for treatment intensity (IPW2). However, among firms with the highest treatment intensity employment grew significantly in the second year even if it lost half of its gains the year after. These finding suggest that the observed growth in employment via the simple propensity score matching estimates were driven by firms with high intensity of treatment. When we consider the impact of the program

[17] This was determined using the rank of the weighting scores for each block of treatment where multiple treatments within blocks referred to multiple treatments being provided to identified firms with the same characteristics.

Table 2: Inverse-Propensity Weighted outcomes of treatment on firms.

	Employment			**Wages**			**Profitability (Profits per worker)**			**Net Job Creation**		
	[1]	[2]	[3]	[1]	[2]	[3]	[1]	[2]	[3]	[1]	[2]	[3]
	IPW1	IPW2	IPW2 - H	IPW1	IPW2	IPW2 - H	IPW1	IPW2	IPW2 - H	IPW1	IPW2	IPW2 - H
Tr yr	**.0002613***	.0002183	-0.000191	-.0000324	0.0000514	0.000034	-.0000249	-0.00000614	0.000005	.0003204	.0001902	-0.000225
*treated	[1.61]	[1.17]	[-0.559]	[-0.39]	[0.49]	[0.134]	[-1.07]	[-0.32]	[0.078]	[1.17]	[0.62]	[-0.421]
Treated	-.0001	.0000592	0.000329	0.0000143	0.0000134	0.000023	9.24e-06	0.00000126	-0.000014	9.93e-07	.0002333	0.000179
* 1yr after	[-0.62]	[0.28]	[0.811]	[0.14]	[0.08]	[0.092]	[0.29]	[0.05]	[-0.209]	[0.00]	[0.77]	[0.293]
Treated	-.0000391	.0000691	**0.000554****	7.67e-06	0.0001061	0.000105	6.86e-06	0.0000349	0.000052	.0001233	.0003563	**0.001295*****
* 2yrs after	[-0.23]	[0.41]	[2.039]	[0.08]	[0.59]	[0.657]	[0.36]	[1.03]	[0.936]	[0.43]	[1.34]	[3.153]
Treated	-.000068	-.0002016	**-0.000373***	**-.0001797****	**-0.0003319****	-0.000257	.0000333	-0.00000221	-0.00001	-.000317	**-.0006052****	**-0.000840****
* 3yrs after	[-0.51]	[-1.44]	[-1.680]	[-2.20]	[-2.05]	[-0.937]	[0.87]	[-0.08]	[-0.213]	[-1.42]	[-2.54]	[-2.185]
Treatment	.0000675	7.23e-06	0.000001	-.0000915	-7.70e-06	0.000021	.0000588	0000614	0.000071	**.0003962***	.0003338	0.000346
group	[0.52]	[0.06]	[0.008]	[-0.94]	[-0.08]	[0.228]	[0.96]	[0.96]	[1.044]	[1.69]	[1.43]	[1.489]
R-squared	0.9202	0.9571	0.963	0.5511	0.5653	0.559	0.0097	0.0093	0.01	0.3321	0.3783	0.379
N. of Obs.	20681	20681	19410	20161	20161	18890	19392	19392	18164	20797	20797	19526
	Turnover per worker			**Turnover (Sales)**			**Firm Survival**			**Exports**		
	[1]	[2]	[3]	[1]	[2]	[3]	[1]	[2]	[3]	[1]	[2]	[3]
	IPW1	IPW2	IPW2 - H	IPW	IPW2	IPW2 - H	IPW	IPW2	IPW2 - H	IPW	IPW2	IPW2 - H
Tr yr	**8.65e-06***	.0000105	-0.000015	.0000444	.0000438	0.000069	**-.008172****	**-.0075299*****	**-0.009554****	.0000439	.0000401	0.000132
*treated	[1.41]	[1.36]	[-1.184]	[0.76]	[0.78]	[0.667]	[-2.01]	[-3.35]	[-2.512]	[0.34]	[0.31]	[0.478]
Treated	**-.0000176 ****	-.0000138	0.000014	-.000105	-.0000904	-0.000146	.0052424	.0004182	-0.006687	-.0001915	-.000158	-0.00032
* 1yr after	[-2.04]	[-1.47]	[1.049]	[-1.55]	[-1.19]	[-1.275]	[1.04]	[0.07]	[-0.556]	[-1.25]	[-0.91]	[-1.033]
Treated	1.73e-06	4.20e-06	0.000009	.0000201	5.06e-06	0.000034	**.0059138***	.0062126	0.009127	.0000373	.0000278	0.000158
* 2yrs after	[0.25]	[0.58]	[0.829]	[0.61]	[0.14]	[0.536]	[1.78]	[0.97]	[0.695]	[0.49]	[0.40]	[1.145]
Treated	**-.0000153****	**-.0000148***	-0.000007	-.0000204	-1.63e-06	0.00001	**-.013485*****	**-.0127257 *****	-0.007571	-.0000118	.0000323	-0.000006
* 3yrs after	[-2.15]	[-1.72]	[-0.513]	[-0.59]	[-0.03]	[0.194]	[-2.94]	[-2.69]	[-0.977]	[-0.15]	[0.30]	[-0.068]
Treatment	8.12e-06	4.29e-06	0.000004	-1.08e-06	-.0000272	-0.000021	.0210545	**0.0218386*****	**0.023598*****	-.0000138	**-.0000846***	-0.000065
Group	[0.79]	[0.59]	[0.991]	[-0.04]	[-1.19]	[-1.059]	[8.53	[8.47]	[8.072]	[-0.25]	[-1.76]	[-1.611]
R-squared	0.3003	0.2245	0.194	0.8705	0.9113	0.923	0.0173	0.0167	0.018	0.8420	0.8694	0.891
N Obs.	19393	19393	18165	19838	19838	18610	20798	20798	19527	19626	19626	18401

The reported results are the inverse-propensity weighted differences, in differences outcomes and the double weighted outcomes.
The IPW2-H refer to firms that have been identified within the group of more intensely treated firms.
All estimates are reported in shares of total in log(n+1) terms.
Profitability is profits (including losses) over employment; Turnover (sales) refers to "chiffre d'affair."
Controls include lags in growth from the previous year, 2 year lags, and the average of the lags 2 to 4 years prior treatment of all variables as well as distance to ports (and sq.)
Individual controls included are for size, year, sector, origin, type of firm, age, age-squared, coastal and exporting activities.

on firm-level net job creation (job gains minus losses within each firm), we observe a similar trend for high intensity treatment groups. However, net job creation decreases for treated firms in the third year after treatment.There is a significant drop in wages in the third year, both in the estimation without intensity weights and those with weights and no discernible trends linked to changes in wages for high intensity firms.

Firm survival was statistically significant and negative for all estimations in the year of treatment. This finding suggests that the program strategy to distribute firm subsidies within the closed door decisions of the COPIL was to help firms that were likely in need of help and about to fail, rather than current winners, or average firms. This already suggests that firm subsidies for failing firms are only temporary bandages, that if anything, only delay firm closure for firms unable to compete in global markets. While many survived until the next years, firm survival rates dropped again in the third year. Firms with high intensity of treatment also decreased on average in the year of treatment, but did not fall again 1-3 years after treatment. This suggests that a more accompanied support for few firms may be better than many subsidies for different firms. Notably, in the entire sample and in the high intensity sample, there was a statistically significant and positive impact of being in the treatment group on firm survival, suggesting that selection effects still were important in determining firm survival outcomes. Consolidating the fact that the allocation of the firm subsidy strategy when to firms already likely to fail and the fact that there was an important group effect suggests that just belonging to the treatment group was not enough but did hinder imminent firm death.

In terms of business related outcomes, there were limited measurable impacts of the program on turnover per worker, profitability and exports. Turnover per worker decreased 3 years after treatment when weighing for intensity of treatment and matching propensity scores, and were negative without intensity controls. The finding on turnover per worker is therefore consistent with the findings in the simple propensity matching average treatment effects in Table 1. Only the value capturing turnover has no directly observed temporal effects in the treatment and treatment $+n$ years.

5.2.2 Heterogeneous Outcomes

The impact of the program by firm characteristics, suggests that increase net job creation observed in the first part of the results is not driven by one type of firm alone (Table 3 and Table 4 for summary results, and Annex Table 8 for full details on all categories). In fact, there were two main trends captured when results are analyzed heterogeneously. First, there is an important impact of simply belonging to the treatment group when looking at employment, net job creation and firm survival outcomes, but not wages. If the treatment allocation was truly random or as good as random due to the matching procedure, this effect should disappear. The fact that it doesn't suggests that for some subgroups of firm sizes, there is still a selection effect due to unobservables. Secondly, holding for this effect, there is a measurable change due to the program for mainly the smallest and largest sized firms.

Employment, Net Job Creation, Wages and Firm Survival As a result of the IUP, we observe growth in jobs for small firms and large firms, but a drop in wages for medium-large and very large firms, suggesting that gains to workers are observed through increased jobs in small firms, while losses in terms of wages are observed in almost all categories of relatively larger firms. For the smallest firms (5-9 employees), we observe an initial drop in employment followed by a larger growth in employment two years after. In the second and third year, we see that firms

that survived increased employment and net job creation. No other group, except for those in the large category (100-199 employees), demonstrated growth in employment or net job creation that was linked with the treatment other than the fact that they belonged to the selected treatment group. Wages in the years of employment growth did not grow for neither small nor large firms, and it in fact fell for medium-sized firms (50-99), very large firms (200-999), and mega firms[18] suggesting that labor was either becoming replaced with lower paid workers or that there was a drop in salaries. Due to sticky wages and union bargaining institutions in Tunisia, is more likely that higher skilled workers are being replaced with lower skilled workers in medium-large, very large and mega firms.

Belonging to the treatment group homogeneously reflected positively on firm survival rates. At the same time, there is still evidence of negative selection of firms in the first year, in particular for medium sized firms. In the third year, support offered to help keep failing firms afloat withered off for firms with between 50-99 employees and between 100-199 employees, and there is a statistically significant negative impact of the program on firm survival due to the treatment. This evidence suggests that this subsidy does not stop firms between 50-99 employees and those between 100-199 employees from failing. Firms that are "too big to fail", will still fail given time. Anecdotally, these estimates suggest that large treated firms are being artificially bolstered by the IUP subsidies. The IUP does not seem to have an impact on increasing firm survival, but rather only stops firm deaths for firms with between 5 and 19 workers, and very large firms with 200 to 999 workers.

Profits, Turnover and Exports Outcomes of the program on profits, turnover and exports were also heterogeneous by size (Table 3 and Table 4 for summary results, and Annex Tables 10, 11 and 12 for full details), and they roughly fit within the findings of the ITCEQ perceptions survey for the first years after treatment. While profits grew for small firms in the first year after treatment, they fell the second year. Medium sized firms had an increase in profitability in the second year with an equal decrease in the third year and no changes directly in profits suggesting that profitability changes were due rather to relative changes in employment to profit ratios. Profits grew for large firms a year after treatment, but estimates were weakly significant. Very large firms observed a drop in profitability and profits the year of treatment, but an increase in profitability the year after treatment which was likely due to lower labor costs (negative wages).

Turnover (sales) and turnover per worker increased only for small firms in the first year after treatment but dwindled off there after. No other significant increases were observed in terms of turnover or turnover per worker in any other category. In context with employment findings, this suggest that some of the gains in turnover were redistributed to workers for small firms, while for large firms the increase in labor was a result of increased profits.

Lastly, small firms experienced increased turnover from exports in the first year after treatment, while no other sized firm experienced positive and significant growth in export value. On the other hand, there is scant evidence showing a drop in exports per unit in the year of treatment and a drop in export values due to belonging to the treatment group for very large firms and with some interpretative stretch, mega firms.

[18] Although the limited sample size of mega firms means that we should interpret coefficients on mega firms with some degree of skepticism.

5.2.3 A focus on size-based outcomes and the political economy of industrial policies

Focusing on outcomes by firm-size can help illustrate in what way one may interpret the role of the IUP within the political economy of a strong command led economy opening up to international competition and trade, like Tunisia. In Tables 3 and 4, we observe a net growth in employment, and some positive improvements in turn over and profits for small firms. In the first year after treatment, employment falls by 0.022% of total employment, but turnover and profits increase. The growth in business outcomes are followed by a small decrease the year after, but estimates are weakly significant and may also reflect a downward curving marginal impact of the program. Employment, however, grows more than its previous loses in the 3rd year after treatment (0.025% of the share of total), and critically, firm survival does not fall. Small firms that are recipients of the IUP are not selected into the program before firm death, and do not show any statistically significant impacts of firm longevity, nor death apart from the positive group level effect. While we would have expected to see better outcomes for small firms on employment and wages, this basic information tells us that small firms transferred at least some of the benefits of the program to labor in the third year. In addition to survival itself, there are immediate impacts on turnover and profits the year after treatment, but the negative but marginally significant coefficient suggests that the impact of the program may be diminishing over time. Given growth in the previous year ($t+1$), growth in the next year ($t+2$) is downward turning, which is consistent with diminishing marginal returns of investment and subsidies.

In comparison, in medium-large firms, employment does not change but wages drop by 0.04% of the share of total wages and some firms do not survive further than their 3rd year after treatment. While profitability increases in the second year, it decreases in the third year, consistent with the year when many medium-large size treated firms cease to survive. In large and very large firms we observe gains in profits, firm deaths and a drop in wages. For larger firms only, there is some weak evidence of growth in employment 2 years after treatment, but it is concurrent with an increases in profits in the same year, but not profits per worker. In very large firms, the increased in profitability exists the same year as a large drop in wages. A 0.005% increase in the share of very large firms in annual profitability levels corresponds to a 0.05% drop in the share of wages for those in very large firms.

In the political economy of Tunisia, this suggests that while the program may have had some benefits for labor in small firms, it largely benefited capital in large firms. Controlling capital owners and providing benefits for association with the government was one of the original concerns of Cammett (2007) and Murphy (2006). Political economists looking to understand how the state may encroach on the private sector may take this as an example. In opening the program to everyone, but continuing to give funds to firms that have very little net effects in increasing employment, but confirmed benefits to capital owners demonstrates the revealed preferences of the state in the use of such a large scaled industrial program. For the small firms that benefited from treatment, there is benefits to both capital owners and to employees, but there is very little in terms of increased wages to workers. If the IUP was looking to modernize its manufacturing and service related manufacturing sectors, we should also observe the hiring of more qualified workers, proxied by higher wages. Alternatively, we should have observed no changes in wages per worker but decreased employment due to machine-based displacement, particularly in larger firms.

Table 3: Select Causal Impacts of Industrial Upgrading program, by size (I)

Small Firms [5, 9]

	[1] **Employment**	[2] **Wages**	[3] **Firm Survival**	[4] **Turnover**	[5] **Profits**	[6] **Profitability**
A*tr	0.000086	0.000496	-0.00339	-0.00004	-0.000045	-0.000275
	[1.591]	[0.831]	[-0.466]	[-0.721]	[-1.122]	[-0.492]
Tr*t+1	**-0.000219*****	0.000142	0.00371	**0.000117****	**0.000186****	0.000083
	[-4.057]	[0.108]	[0.425]	[2.092]	[2.377]	[0.097]
Tr*t+2	-0.000040	-0.001238	0.001221	**-0.000108***	**-0.000213***	0.000321
	[-0.730]	[-0.765]	[0.164]	[-1.760]	[-1.739]	[0.294]
Tr*t+3	**0.000246*****	0.001604	-0.006393	0.00000	-0.000019	-0.000153
	[4.685]	[1.623]	[-0.631]	[0.006]	[-0.161]	[-0.343]
Tr Gr.	**0.000065****	-0.000452	**0.031899*****	0.000037	0.000090	0.000268
	[2.012]	[-1.107]	[5.083]	[0.822]	[1.124]	[0.605]
Obs.	3556	3037	3556	3169	1706	2802
R-squared	0.323	0.417	0.032	0.333	0.963	0.38

Medium-Large Firms [50,99]

	[1] **Employment**	[2] **Wages**	[3] **Firm Survival**	[4] **Turnover**	[5] **Profits**	[6] **Profitability**
A*tr	-0.000088	-0.000112	-0.0028	-0.000015	0.000073	0.000008
	[-0.712]	[-0.878]	[-0.780]	[-0.366]	[0.584]	[0.370]
Tr*t+1	-0.000039	-0.000129	-0.00026	-0.000049	-0.000062	-0.00001
	[-0.289]	[-1.108]	[-0.039]	[-1.085]	[-0.500]	[-0.400]
Tr*t+2	-0.000165	0.000213	0.00174	0.000013	-0.000007	**0.000078****
	[-1.194]	[1.541]	[0.172]	[0.305]	[-0.081]	[2.100]
Tr*t+3	-0.000002	**-0.000397****	**-0.017542****	0.000011	0.000012	**-0.000074****
	[-0.012]	[-2.406]	[-2.152]	[0.255]	[0.156]	[-2.008]
Tr Gr.	**0.000268*****	0.000056	**0.028777*****	0.000001	0.000002	0.000003
	[2.829]	[0.757]	[4.771]	[0.066]	[0.040]	[0.217]
Obs.	3837	3837	3837	3723	2215	3723
R-squared	0.289	0.875	0.036	0.895	0.445	0.477

Table 4: Select Causal Impacts of Industrial Upgrading program II, by size (1)

Large Firms [100,199]

	[1] **Employment**	[2] **Wages**	[3] **Firm Survival**	[4] **Turnover**	[5] **Profits**	[6] **Profitability**
A*tr	0.000076	0.000150	-0.006344	0.000023	-0.000156	-0.000078
	[0.266]	[0.935]	[-1.602]	[0.472]	[-0.780]	[-0.769]
Tr*t+1	-0.000050	-0.000119	-0.006731	0.000019	-0.000275	0.000012
	[-0.229]	[-0.879]	[-0.501]	[0.407]	[-1.066]	[0.154]
Tr*t+2	**0.000309***	-0.000013	0.012893	-0.000002	**0.000263***	0.000089
	[1.661]	[-0.115]	[0.880]	[-0.059]	[1.678]	[0.851]
Tr*t+3	-0.000076	-0.000145	**-0.016701***	-0.000039	0.000072	0.000106
	[-0.451]	[-1.264]	[-1.886]	[-1.346]	[0.734]	[0.941]
Tr Gr.	-0.000084	0.000005	**0.020365*****	-0.000035	0.000014	0.000202
	[-0.439]	[0.049]	[3.820]	[-1.541]	[0.203]	[0.952]
Obs.	3260	3260	3260	3188	1822	3188
R-squared	0.39	0.886	0.017	0.909	0.616	0.016

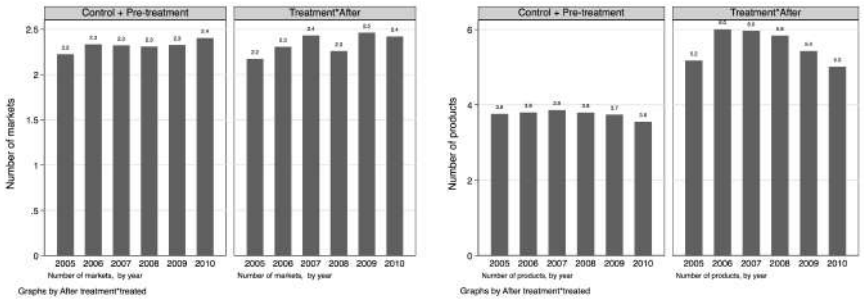
Very Large Firms [200,999]

	[1] **Employment**	[2] **Wages**	[3] **Firm Survival**	[4] **Turnover**	[5] **Profits**	[6] **Profitability**
A*tr	0.000640	**0.000352***	0.000801	0.000037	**-0.000703****	**-0.000044*****
	[0.850]	[1.858]	[0.284]	[0.102]	[-2.239]	[-3.327]
Tr*t+1	0.000634	**-0.000501*****	0.000918	-0.000389	0.000170	**0.000049*****
	[0.581]	[-2.928]	[0.377]	[-0.860]	[0.731]	[2.978]
Tr*t+2	0.000195	-0.000061	0.000951	0.000141	0.000170	-0.000021
	[0.246]	[-0.429]	[0.410]	[0.864]	[0.623]	[-1.513]
Tr*t+3	-0.000680	0.000153	-0.004235	0.000172	-0.000309	-0.000012
	[-0.881]	[1.257]	[-1.317]	[0.702]	[-1.124]	[-0.762]
Tr Gr.	-0.000658	0.000021	**0.008495****	**-0.000174***	-0.000032	**-0.000019****
	[-1.244]	[0.213]	[2.530]	[-1.840]	[-0.348]	[-2.291]
Obs.	2582	2582	2582	2550	1435	2550
R-squared	0.75	0.876	0.025	0.907	0.691	0.582

5.2.4 Exports by treatment group

One way of looking at whether the IUP program increased global competitiveness is to evaluation changes on aggregate outcomes. Because the program was meant to help firms face new challenges from external competition, we expect firms to either compete on prices or by increasing to new markets or diversifying within good markets. Descriptively, figure 5 shows that treatment groups did not have particularly higher access to markets, but they did have a more diverse set of products for exports. While these findings are macroeconomic, and not causal on a firm-level, they demonstrate that treatment firms increasingly diversified products but kept similar market strategies on an aggregate level. It is difficult to argue that product diversification was only due to treatment effects, however, on a macroeconomic level, the general trends demonstrate that treated firms did demonstrate growth in product diversification, but not market diversification.

Figure 5: Number of Products and Markets, by treatment status (after)



Source: RNE

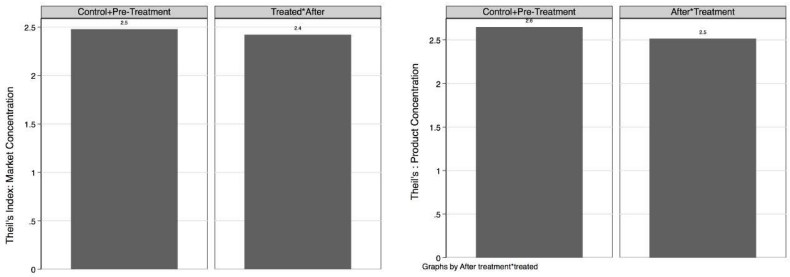
Similarly, we can evaluate the relative concentration of markets and products by evaluation the Theil's entropy index (Theil, 1972), given by

$$T = \frac{1}{n}\sum_{k=1}^{n}\frac{x_k}{\mu}ln\left(\frac{x_k}{\mu}n\right) \quad where \quad \mu = \frac{1}{n}\sum_{k=1}^{n}X_k \tag{2}$$

The Theil index measures an entropic "distance" the population is away from the egalitarian state of everyone having the same values, 0. If all firms have the same values of products (or value of exports to markets), then the index will go towards 0. The index is higher with more diversified values of exports to markets and for products. Unlike the figures provided on the number of products and the number of markets firms access, the Theil index does not show how many different products firms export or markets firms export to, but how varied export values are by market and product values. Figure 6 shows that, treated firms have less variance (and in context higher export values), than control firms in products and markets. This suggests that prices for by export markets and by products are quite similar for firms after treatment.

Interpreting these findings, treated firms are more concentrated in the values of exports both by markets and products (with a lower deviations), while non-treated firms are more likely diversified in values of exports (higher deviations). With the higher overall values of exports, treated firms are producing exports that are sold at relatively the similar prices by product and by market, with consistently higher values than non-treated firms in the year of

Figure 6: Theil Entropy Index, by treatment status (after)



Source: RNE

treatment (also see Figure 4). Suggestive of concentration of markets and products in treated firm.

A break down of the within and between components of the index for both markets (Annex Table 15) and products (Annex Table 16) suggests that an overwhelming portion of outcomes is explained by changes in the intensive margin of trade (or specialization) rather than diversification (extensive margin). In simpler terms, the decomposition market and product concentration shoes that the relatively more concentrated outcomes are are a result of specialization within treatment and control groups, rather than due movement in or out of treatment and control groups. Anecdotally, this supports the empirical findings that demonstrated that there was only a very small impact of treatment on business and trade outcomes.

While we were unfortunately not able to capture this in the regression analysis due to data limitations, [19] the macro-level analysis suggests that there may be more products exported, but firms seem to all be exporting the same products (see Figure 4). Treated firms as a whole are receiving higher export prices even if firm-level analysis does not show that it is due specifically to the IUP treatment itself, in any type of firms, except for in small firms. These findings match the ITCEQ perception surveys.

5.2.5 Caveats and and sensitivity testing

The results and interpretations elaborated above should be taken with some caution. Firstly, there may be some concern of the robustness of our estimates. We argue that like an intention-to-treat intervention, there is a variation among firms in the treatment group that are always-takers, never-takers and defiers that can potentially confound results. We argue that this would cause a downward (attenuation) bias that may actually cause our identification procedure to not capture the full impact or overlook outcomes of the program.

To convince readers otherwise, we can show in Figure 5 that even inducing marginal errors of 5 to 10% lead of a transitional type (movement in and out of treatment groups) induces attenuation by reducing the standard errors of the beta terms, but not the direction of the variables. If anything, the results presented demonstrate that even the non-significant findings are potentially informative. To induce the error-in-variables of the treatment we randomly allocated half of the 5% (and later 10%) of treated firms and placed them into the non-treatment group,

[19] Detailed exports data was only available for a subset of the years that other data was available (2005-2010).

and a second random half of the non-treatment into the treatment group. The results in Table 5 shows that values that were very significant in the original estimation decrease in significance for employment, wages, turnover, firm survival and turnover per worker, but does not become significant in any variable, nor does the direction of the effect change.

Table 5: Sensitivity and Robustness test of identifying assumptions using artificially enduced errors-in-variables.

	Robustness test with 5 % and 10% induced measurement error-in-variables					
	Employment			Wages		
	[1] Original	[2] 5% Error	[3] 10% Error	[1] Original	[2] 5% Error	[3] 10% Error
PSM ATE	**0.001416*** **	0.000426	0.000426	**-0.001355*** **	-0.000055	0.000063
	[3.296]	[0.899]	[0.899]	[-8.369]	[-0.274]	[0.407]
	Profitability			Net Job Creation		
	[1] Original	[2] 5% Error	[3] 10% Error	[1] Original	[2] 5% Error	[3] 10% Error
PSM ATE	0.000059	0.000048	0.000112	-0.000087	0.000202	0.000057
	[0.728]	[0.143]	[0.424]	[-0.373]	[0.891]	[0.323]
	Turnover (Sales)			Firm Survival		
	[1] Original	[2] 5% Error	[3] 10% Error	[1] Original	[2] 5% Error	[3] 10% Error
PSM ATE	**-0.000724*** **	-0.000354	-0.000253	**0.006581** **	0.000651	0.00356
	[-3.298]	[-1.312]	[-1.234]	[1.995]	[0.205]	[1.471]
	Exports			Turnover per worker		
	[1] Original	[2] 5% Error	[3] 10% Error	[1] Original	[2] 5% Error	[3] 10% Error
PSM ATE	-0.000499	-0.000271	-0.000164	**-0.000076*** **	-0.000052	-0.00005
	[-1.498]	[-0.786]	[-0.616]	[-4.003]	[-0.605]	[-0.749]

Continuing from the identification caveat, the first best outcome would also to have information on the type of treatment recieved. The program information provided officially tells readers that the program varies between material and non-material subsidies and firm support, but it was not clear how each types of subsidies is distributed among firms or in what form. There may be heterogeneities in the type of treatment recieved by firms that may also be driving results. Unfortunately, we are not able to distinguish the impact of the different types of material and non-material investments that were provided to beneficiaries. As we saw from the ITCEQ survey, both are relevant for treated firms and treated firms reported expecting more immaterial investments than non-treated firms. A strong shift in material and non-material investments may have been useful to provide more information on how the funds are being used, but this was not available. It would have been optimal, if possible, to have access to further information on investments and value-added to estimate measures of productivity as

boosting competitiveness is more sustainable through productivity growth. In the meanwhile, for the interpretation of these results we have to consider the share of material and immaterial subusidies from the program as exogenous.

6 Winners and Losers : A short discussion

The Tunisian IUP was not a failure, but it was not a landslide victory for the constituency either. There were variations in the distribution of outcomes between labor and capital, which gave the program its wins and loses. This paper links the heterogeneity of outcomes to the model of economic governance in countries with a strong state and close government-business ties.

The biggest winners were firms with multiple treatments and those in the treatment groups. In the overall picture, employment and firm survival increased, but wages and sales (turnover) decreased and there is no significant impact on profitability, net job creation or exports. On one hand, the findings are positive for firms with multiple treatments where we observe positive outcomes for job creation and employment. Secondly, there is evidence to suggest that the IUP is supporting firms that are about to fail, and their efforts do not necessarily lead to longevity but rather just a delay in firm deaths. Because there is a net positive impact on firm longevity due to simply belonging to the treatment group, firm survival is likely endogenous, as the IUP program selects firms that are about to fail. While this can be beneficial for capital owners and employees, given that increases in firm deaths were captured in the third year, it is possible that the IUP program may simply be postponing the inevitable death of non-competitive firms.

Lastly, there is some descriptive evidence suggesting that in the year of treatment, treated firms increase the number of products exported and more frequently attain similar values of trade as competitors for goods on the global markets. This hints at specialization strategy by treated firms. There is no evidence of market specialization nor diversification, but holding market variation constant while increasing product variation still remains a positive outcome for firms.

Workers are winners when IUP funds are received by small firms. Inversely, it is more likely that profits are retained by capital owners when treatment is assigned to medium-large and very-large firms. When small firms receive treatment, employment and net job creation fall, but recover 2-3 years later. While there is no change in firm survival or wages, a growth in profits preceded growth in net jobs and creation, and while profits rescinded marginally shortly after, this did not impact the level of employment and net job creation.

The story is rosier for capital owners in medium, large and very large firms. Medium sized firms do not increase employment nor net job creation, but average wages dropped 3 years after treatment, even as profitability rose in the year prior to wage drops. Profitability losses in the third year that offset gains from the second year, immediately were reflected on wages. At least, large firms increased employment and net job creation after treatment in the same year as profits increased, however the motivation of the increased in employment is unclear as no other significant trends indicate motivation for hiring more workers. The worst outcome for workers and best outcome for owners of capital were in very large firms (and descriptively in mega firms). Without increasing employment after to treatment, the firms reduced wages,

remained alive and were even positively correlated with firm survival simple due to treatment group effects, increased profitability, and were becoming more competitive in terms of value of exports per unit. There is no evidence of sharing profits to workers in terms of jobs nor wages.

This allocation of the IUP therefore faces a trade-off. Providing support to firms that are 1.) employing more workers, but retain a larger part of the benefits generated, or 2.) increase employment and share profits. The first option is arguable preferable for capital owners if the purpose of the program was to increase competitiveness of industries.But workers would more likely benefit from more intensified treatment towards smaller firms, or completely other types of initiatives that may have a positive impact on wages per worker.

The evaluation of the IUP in Tunisia demonstrates how firm subsidies can go further for workers and employment when they are targeted at small firms, but that selection effects are likely to dominate when there is an internalized opaque selection process. It is also suggestive of the use of such programs for the purpose of controlling the private sector rather than encouraging its growth and sustainability. The discussion on the impact of the IUP is therefore summarized into three points. First, small recipient firms tend to increase employment after treatment as a result of increased profits in the prior year. This suggests that benefits are at least partially retained by owners of labor when funds are distributed to small firms. Secondly, larger recipient firms rarely, if ever, share gains from profits to workers in terms of jobs or wages. This suggests that benefits are retained by capital owners when funds are allocated to larger firms. If the government is still willing to support larger firms and jointly ensuring gains to workers, it may be interested in alternative strategies outside the scope of this paper.

In context with the literature on strong command-led economies and the principal-agent theory, we make two contributions. First if the government indeed uses business to control the economy, then the IUP is a good tool. The program distributes benefits to both labor and capital. It creates jobs in some types of firms, and helps -even artificially - limit firm deaths in others. There is little statistically significant impact on increasing competitively of export goods through prices, and descriptive information on increases in number of products exported and larger gains to treated firms after treatment. Unfortunately, with the current data, little can be said about how firms competes in terms of quality of goods. Secondly, if the government were indeed the agent and the population the principal, then we should be seeing more emphasis on benefits to labor across the board. The current arrangement for distributing funds via the IUP does not indicate that labor owners (non-capital owners) are the ultimate principals while the government is the welfare- maximization seeking agent. In this case, there is more evidence to suggest a more symbiotic relation between businesses and the state such that the ultimate agent is businesses and the principal remains the state.

7 Conclusion

It is clear that the IUP impacted firms in different ways. As predicted by the literature, there were some aspects that were successful. The reported perceptions from the ITCEQ survey, led us to believe that employment should grow as a result of the program (Figure 8). This was the case on the global level (Table 2), but was not evident on a less aggregate level (Tables 3 and 4). For larger firms, the program was associated with gains to capital owners. There may have been more employment initially in large firms, but no increase in employment numbers or quality

(wages). In small sized firms, growth in profits preceded growth in employment, that did not immediately retract once profitability wore off.

Lastly, while some command-led initiatives can provide some benefits (Murphy, 2006; Cammett, 2007), the findings of this paper does not suggest that it ultimately serves the wider public, nor do they adequately push for reforms that can lead Tunisia into the next step of its industrial development. This particular program keep firms on life-support, when they could have been letting them fail to free up more productive labor and capital. The logic of the IUP that was communicated to the media and stakeholders, was that the IUP would help Tunisian firms access new markets and modernize its sectors. While there was at least an increase in employment, and some evidence of increased product exports, there is little to show for modernization's impacts on job quality. There was no evidence that wages or skills went up because of the program and only limited evidence of increased diversification of markets.

In terms of policy implications, the IUP can be reformed to focus on encouraging entrepreneurship, improving productivity (rather than just competitiveness) and adopting innovation products, processes and management practices to compete with global firms. In addition, focusing on small firms would increase the impact of each dinar spent and avoid expenditures on dying dinosaurs.

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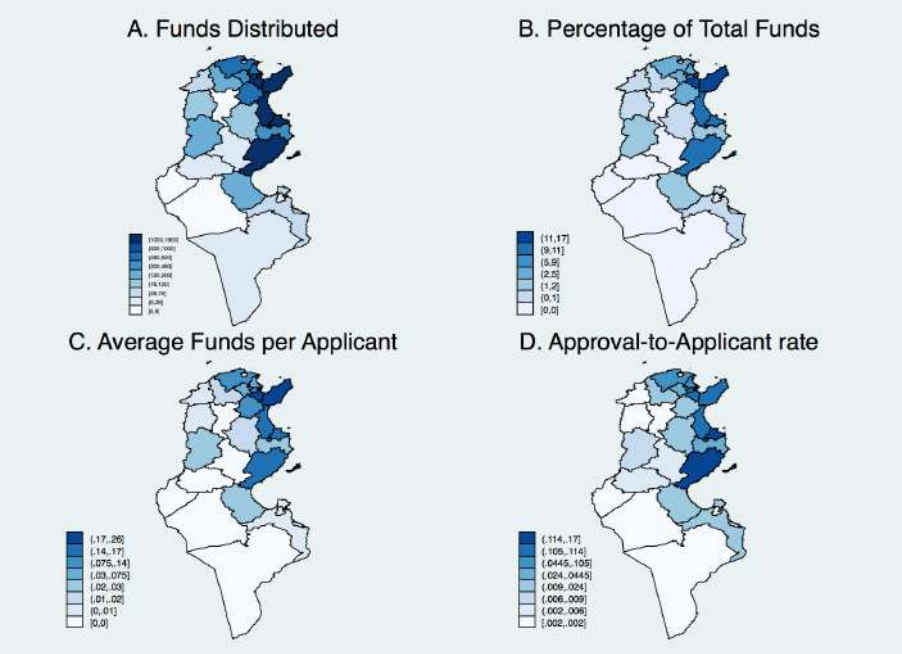
A Appendix

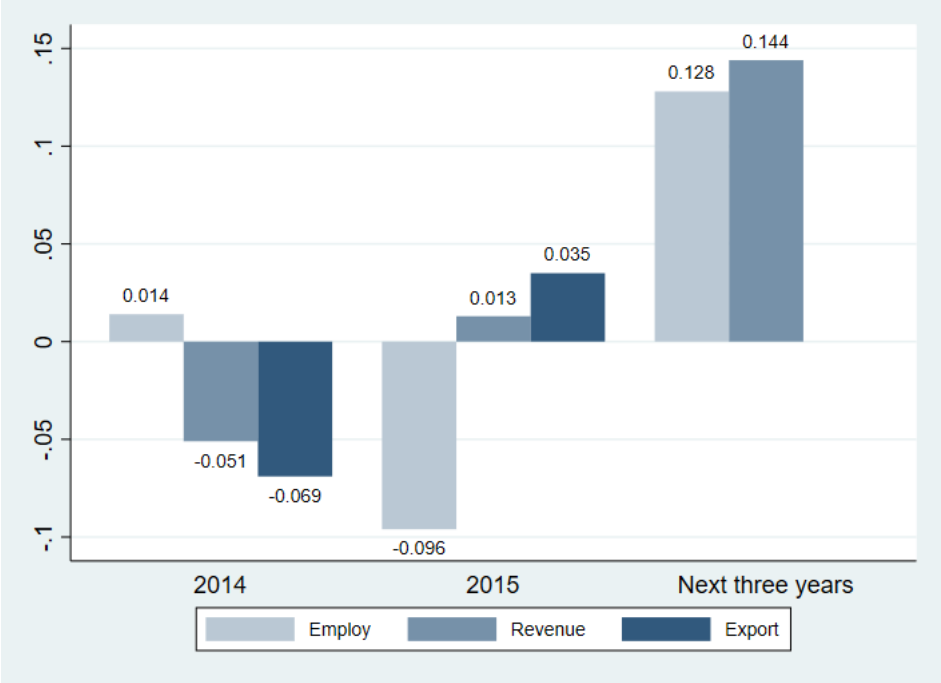
Figure 7: Distribution and rejection rates of IUP funds by region



Source: Bureau de Mise à Niveau

Note: Rates are weighed by total applicants per region. Total and average funds are in current millions of Tunisian Dinars.

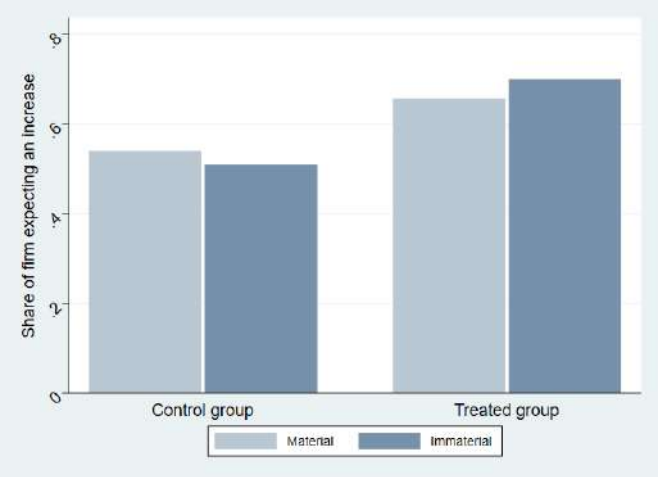
Figure 8: Differences in Reported Increases in Employment, Profitability and Export outcomes



Source: ITCEQ

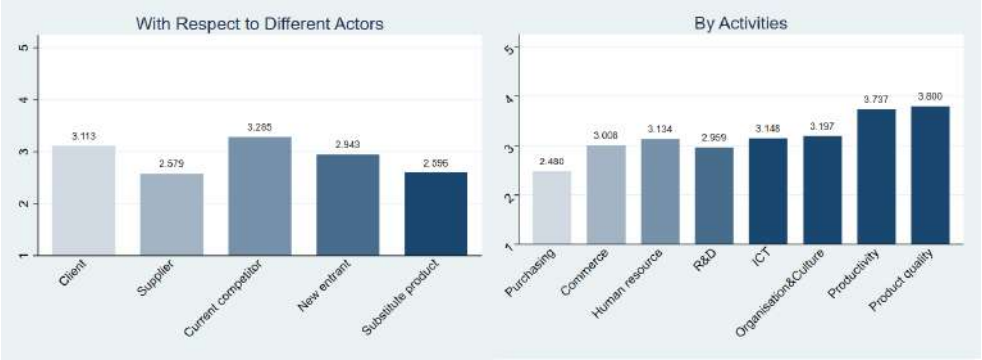
Note: Figure reports percentage of firms reporting any type of increase of each outcome. A positive percentage indicates higher reported outcomes for treated firms.

Figure 9: Decomposition of expected investment



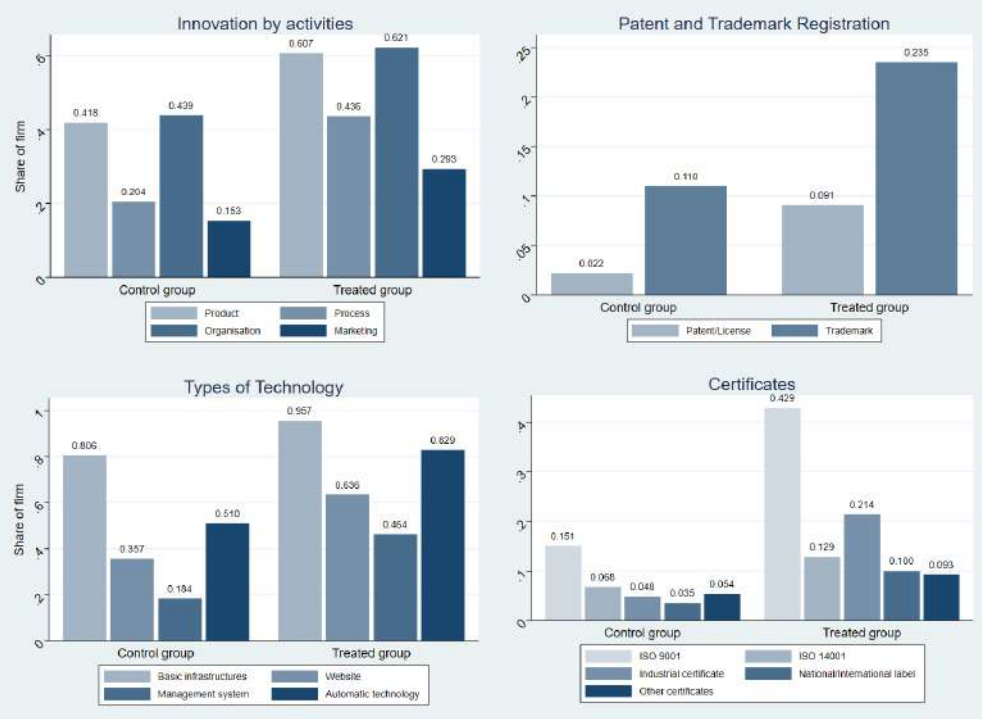
Source: ITCEQ

Figure 10: Competitiveness



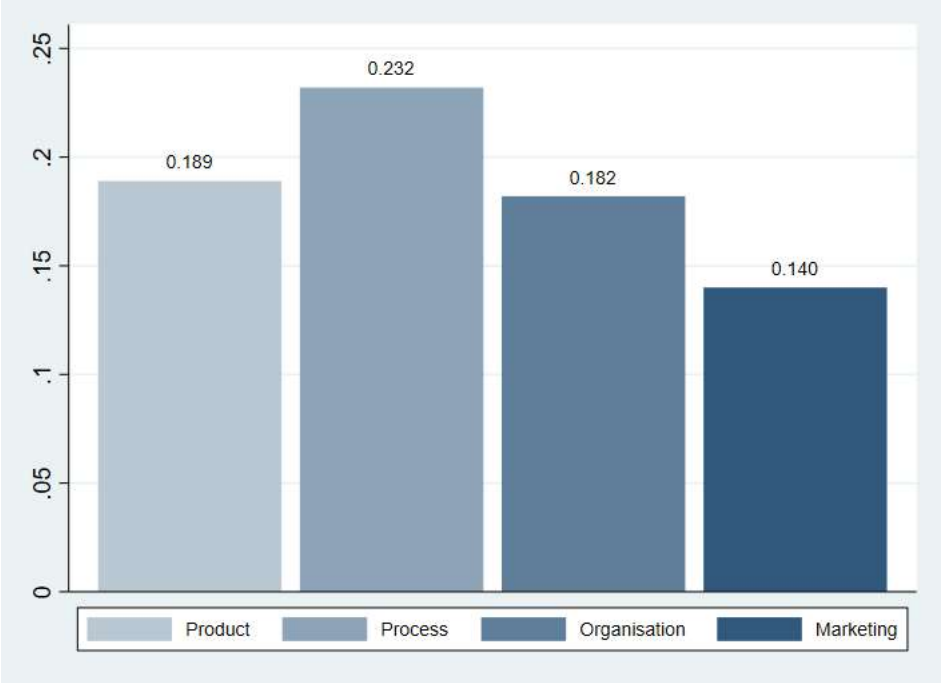
Source: ITCEQ

Figure 11: Technological Level



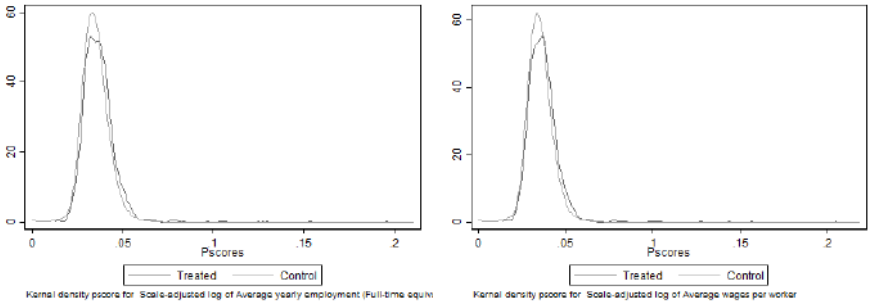
Source: ITCEQ

Figure 12: Innovation



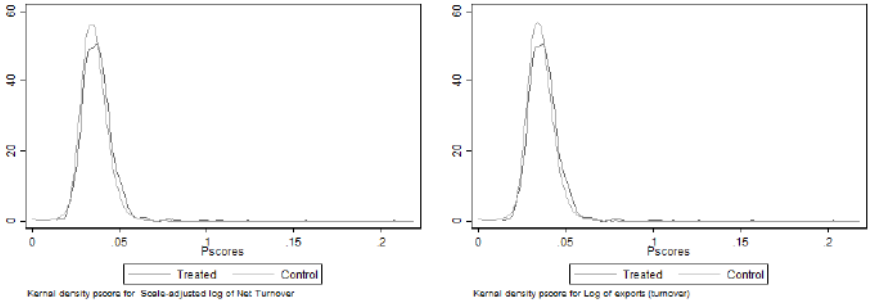
Source: ITCEQ

Figure 13: Matching performance: Employment and wages



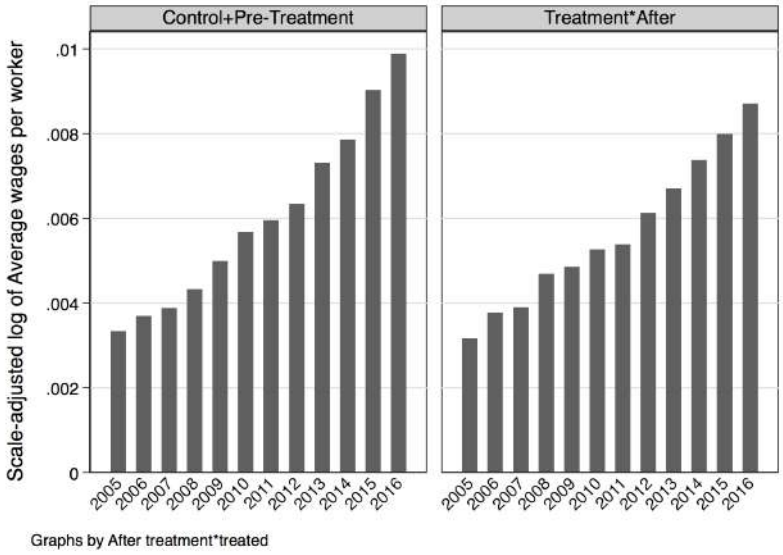
Source: RNE

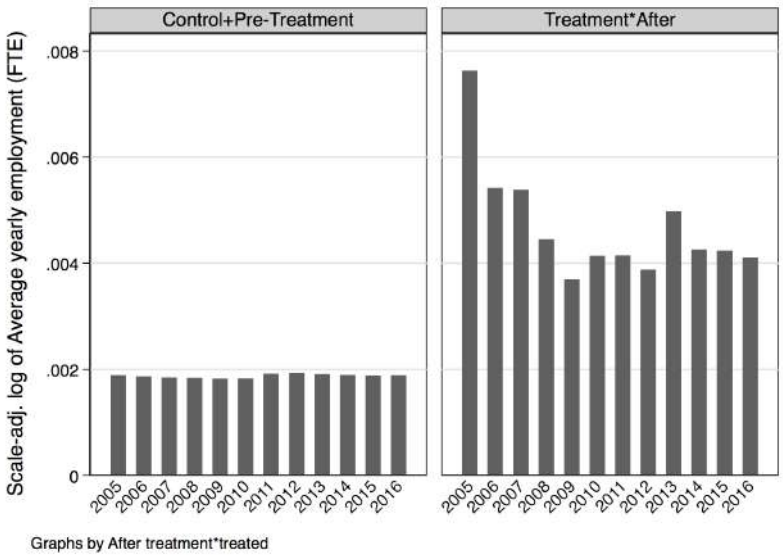
Figure 14: Matching performance: Turnover and exports



Source: RNE

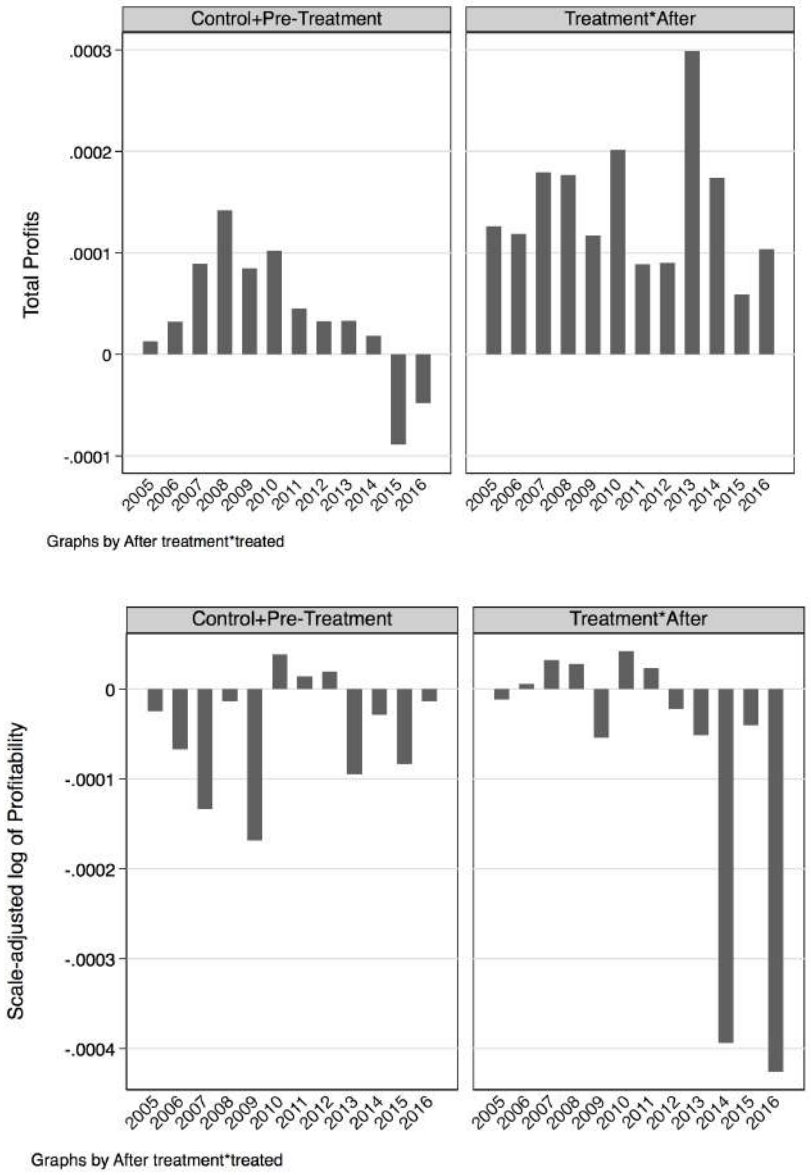
Figure 15: Wages and Employment, by treatment status (after)





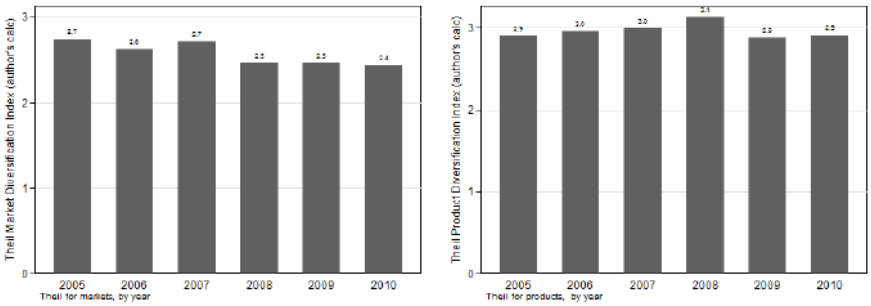
Source: RNE

Figure 16: Profits and Profitability, by treatment status (after)



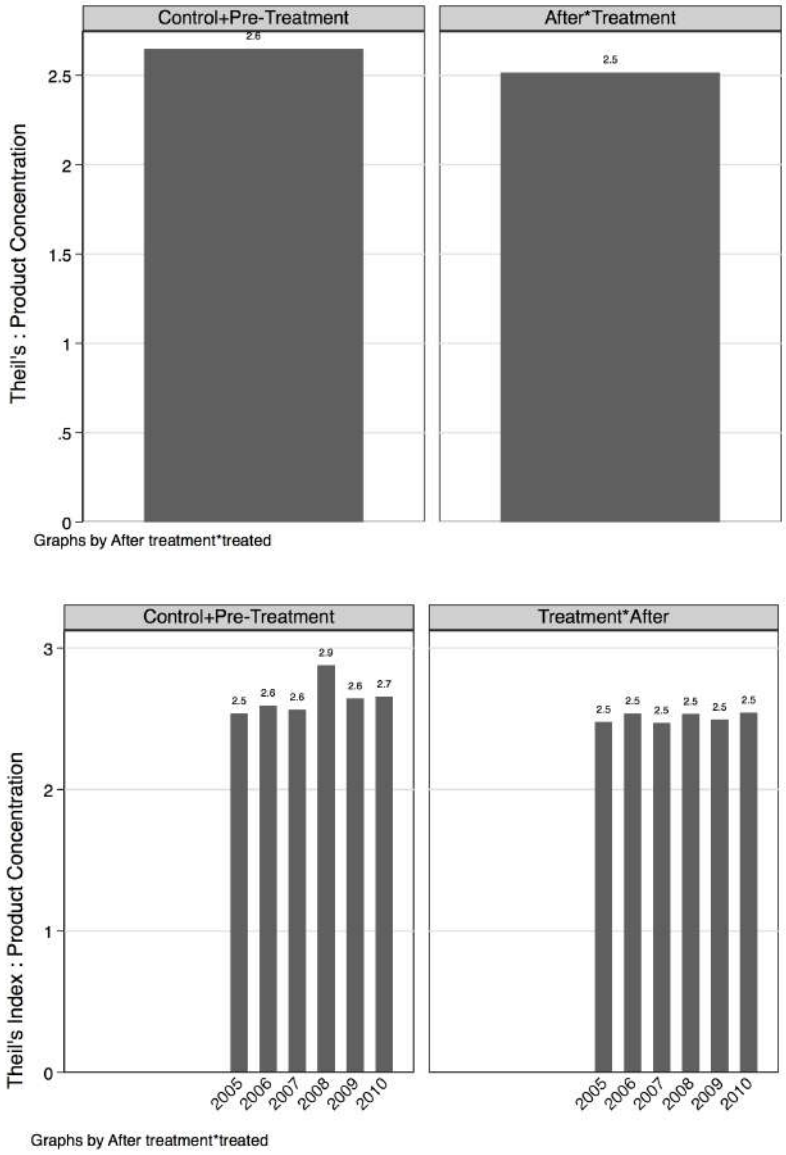
Source: RNE

Figure 17: Thiel's Generalized Enthropy Index for Market and Product Concentration



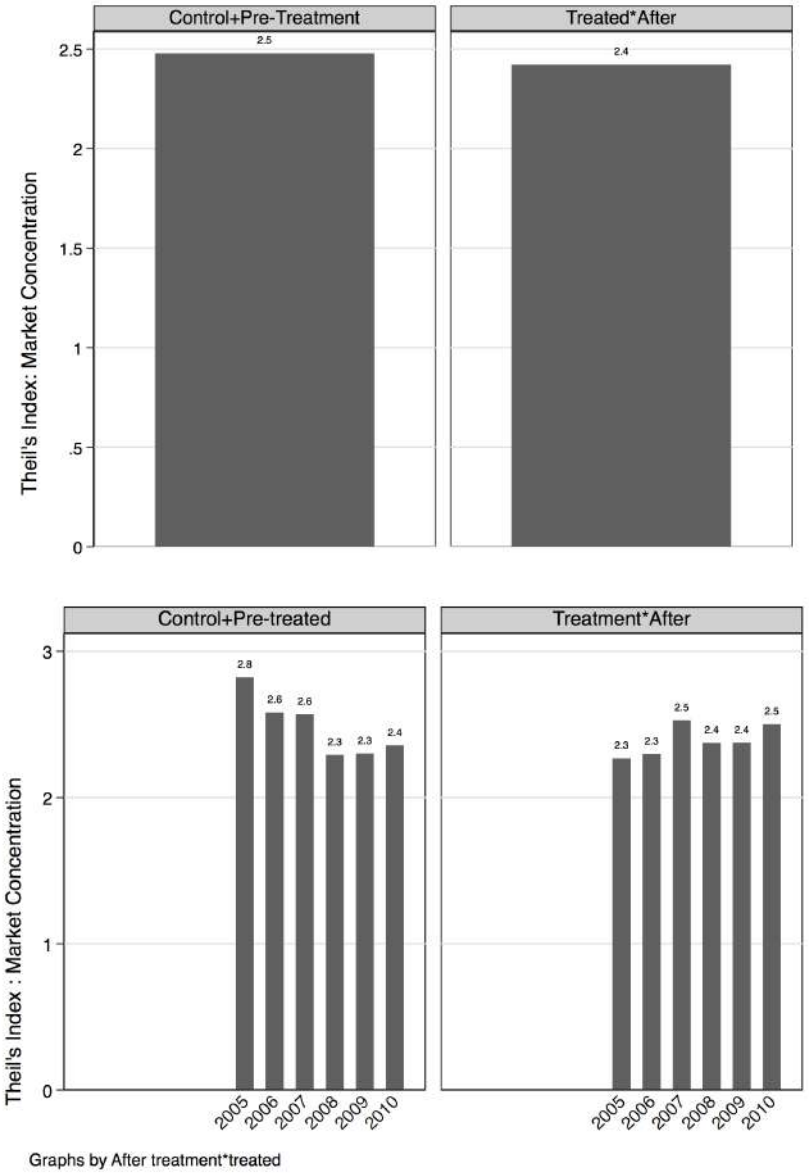
Source: RNE

Figure 18: Thiel's Generalized Enthropy Index for Product Concentration



Source: RNE

Figure 19: Thiel's Generalized Enthropy Index for Product Concentration



Source: RNE

Table 6: Matching Support summaries for key variables.

	Employment			Wages		
	Off Support	On support	Total	Off Support	On support	Total
Untreated	456	22,948	23,404	399	21,601	22,000
Treated	1	1,453	1,454	1	1,446	1,447
Total	457	24,401	24,858	400	23,047	23,447

	Turnover			Exports		
	Off Support	On support	Total	Off Support	On support	Total
Untreated	285	21,510	21,795	313	21,048	21,361
Treated	0	1,379	1,379	0	1,375	1,375
Total	285	22,889	23,174	313	22,423	22,736

Table 7: Matching performance for key variables.

Employment								
Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
Unmatched	0.175	1943.63	0.000	13.2	8.8	114.0*	0.34*	100
Matched	0.012	47.27	0.099	2.1	1.3	24.5	1.32	81

Wages								
Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
Unmatched	0.166	1806.78	0.000	13.5	6.5	119.5*	0.35*	100
Matched	0.006	22.91	0.956	1.7	1.1	17.7	0.70	75

Turnover								
Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
Unmatched	0.171	1789.82	0.000	13.7	8.7	109.9*	0.31*	100
Matched	0.009	35.94	0.519	1.7	1.3	22.5	1.20	100

Exports								
Sample	Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
Unmatched	0.169	1753.76	0.000	13.8	8.9	108.4*	0.32*	100
Matched	0.012	45.20	0.196	2.9	1.4	25.5*	.80	81

Table 8: Heterogeneous treatment effects of IUP on Employment and Net Job Creation, by size

	Employment						
	[1] Small [5, 9]	[2] Sm-Med [10, 19]	[3] Medium [20, 49]	[4] Med-Lge [50, 99]	[5] Large [100, 199]	[6] Very lge [200, 999]	[7] Mega (1000+)
After treatment	0.000086	0.000010	0.000086	-0.000088	0.000076	0.000640	-0.020099
*treated	[1.591]	[0.240]	[1.155]	[-0.712]	[0.266]	[0.850]	[-0.356]
Treated	**-0.000219*****	-0.000042	-0.000067	-0.000039	-0.000050	0.000634	0.007887
* 1 year after	[-4.057]	[-0.587]	[-0.436]	[-0.289]	[-0.229]	[0.581]	[0.259]
Treated	-0.000040	0.000024	-0.000015	-0.000165	**0.000309***	0.000195	
* 2 years after	[-0.730]	[0.369]	[-0.099]	[-1.194]	[1.661]	[0.246]	
Treated	**0.000246*****	0.000032	-0.000095	-0.000002	-0.000076	-0.000680	
* 3 years after	[4.685]	[0.859]	[-1.509]	[-0.012]	[-0.451]	[-0.881]	
Treatment	**0.000065****	0.000042	**0.000131****	**0.000268*****	-0.000084	-0.000658	0.005824
Group	[2.012]	[1.449]	[2.233]	[2.829]	[-0.439]	[-1.244]	[0.372]
Obs.	3556	2539	4682	3837	3260	2582	225
R-squared	0.323	0.161	0.239	0.289	0.39	0.75	0.949

	Net Job Creation						
	[1] Small [5, 9]	[2] Sm-Med [10, 19]	[3] Medium [20, 49]	[4] Med-Lge [50, 99]	[5] Large [100, 199]	[6] Very lge [200, 999]	[7] Mega (1000+)
After treatment	0.000067	-0.000157	0.000106	-0.000278	0.000201	-0.000255	0.049751
*treated	[0.495]	[-1.213]	[0.601]	[-1.349]	[0.458]	[-0.214]	[1.280]
Treated	**-0.001141*****	-0.000064	-0.000139	-0.000048	-0.000178	0.001799	-0.038
* 1 year after	[-2.722]	[-0.453]	[-0.527]	[-0.204]	[-0.425]	[1.215]	[-0.908]
Treated	**0.000809****	0.000782	-0.000013	-0.000196	**0.000798****	0.001377	0.018554
* 2 years after	[2.022]	[1.503]	[-0.047]	[-0.774]	[2.149]	[1.280]	[1.418]
Treated	0.000205	-0.000808	-0.000163	-0.000165	-0.000455	-0.001744	-0.006329
* 3 years after	[0.636]	[-1.325]	[-1.288]	[-0.713]	[-1.542]	[-1.376]	[-1.591]
Treatment	0.000057	**0.000126****	**0.000337*****	**0.000741*****	0.000254	-0.000831	-0.005065
Group	[0.448]	[1.972]	[3.353]	[4.015]	[0.731]	[-0.873]	[-0.445]
Obs.	3,556	2,539	4,682	3,837	3,260	2,582	341
R-squared	0.863	0.909	0.718	0.614	0.545	0.288	0.771

Table 9: Heterogeneous treatment effects of IUP on Wages and Firm Survival, by size

	Wages						
	[1] Small [5, 9]	[2] Sm-Med [10, 19]	[3] Medium [20, 49]	[4] Med-Lge [50, 99]	[5] Large [100, 199]	[6] Very lge [200, 999]	[7] Mega (1000+)
After treatment	0.000496	0.000474	-0.000045	-0.000112	0.000150	**0.000352***	**-0.004711****
*treated	[0.831]	[1.514]	[-0.244]	[-0.878]	[0.935]	[1.858]	[-2.620]
Treated	0.000142	-0.000240	0.000398	-0.000129	-0.000119	**-0.000501*****	0.000732
* 1 year after	[0.108]	[-0.574]	[1.084]	[-1.108]	[-0.879]	[-2.928]	[1.028]
Treated	-0.001238	-0.000654	-0.000348	0.000213	-0.000013	-0.000061	
* 2 years after	[-0.765]	[-1.222]	[-0.862]	[1.541]	[-0.115]	[-0.429]	
Treated	0.001604	0.000811	-0.000140	**-0.000397****	-0.000145	0.000153	
* 3 years after	[1.623]	[1.390]	[-0.839]	[-2.406]	[-1.264]	[1.257]	
Treatment	-0.000452	0.000208	-0.000106	0.000056	0.000005	0.000021	**-0.000573*****
Group	[-1.107]	[1.050]	[-0.869]	[0.757]	[0.049]	[0.213]	[-2.730]
Obs.	3037	2538	4682	3837	3260	2582	225
R-squared	0.417	0.737	0.823	0.875	0.886	0.876	0.913

	Firm Survival						
	[1] Small [5, 9]	[2] Sm-Med [10, 19]	[3] Medium [20, 49]	[4] Med-Lge [50, 99]	[5] Large [100, 199]	[6] Very lge [200, 999]	[7] Mega (1000+)
After treatment	-0.00339	-0.047252	**-0.016279****	-0.0028	-0.006344	0.000801	0.03559
*treated	[-0.466]	[-1.210]	[-2.043]	[-0.780]	[-1.602]	[0.284]	[0.320]
Treated	0.00371	0.031063	0.011055	-0.00026	-0.006731	0.000918	0.000013
* 1 year after	[0.425]	[1.013]	[1.279]	[-0.039]	[-0.501]	[0.377]	[0.000]
Treated	0.001221	0.00695	-0.005075	0.00174	0.012893	0.000951	0.005569
* 2 years after	[0.164]	[0.180]	[-0.459]	[0.172]	[0.880]	[0.410]	[0.166]
Treated	-0.006393	-0.025806	0.004951	**-0.017542****	**-0.016701***	-0.004235	0.046943
* 3 years after	[-0.631]	[-0.621]	[0.438]	[-2.152]	[-1.886]	[-1.317]	[1.362]
Treatment	**0.031899*****	**0.031469*****	**0.027882*****	**0.028777*****	**0.020365*****	**0.008495****	-0.015945
Group	[5.083]	[2.698]	[5.890]	[4.771]	[3.820]	[2.530]	[-0.640]
Obs.	3556	2539	4682	3837	3260	2582	342
R-squared	0.032	0.078	0.034	0.036	0.017	0.025	0.211

Table 10: Heterogeneous treatment effects of IUP on Profitability and Profits, by size

	Profitability (Profits/L)						
	[1] Small [5, 9]	[2] Sm-Med [10, 19]	[3] Medium [20, 49]	[4] Med-Lge [50, 99]	[5] Large [100, 199]	[6] Very lge [200, 999]	[7] Mega (1000+)
After treatment	-0.000275	-0.000061	0.000014	0.000008	-0.000078	**-0.000044*** **	0.000049
*treated	[-0.492]	[-0.814]	[0.510]	[0.370]	[-0.769]	[-3.327]	[0.343]
Treated	0.000083	0.000001	0.00004	-0.00001	0.000012	**0.000049*** **	**-0.000216** **
* 1 year after	[0.097]	[0.015]	[0.996]	[-0.400]	[0.154]	[2.978]	[-2.187]
Treated	0.000321	-0.000102	-0.000053	**0.000078** **	0.000089	-0.000021	
* 2 years after	[0.294]	[-1.247]	[-1.197]	[2.100]	[0.851]	[-1.513]	
Treated	-0.000153	0.000072	0.000015	**-0.000074** **	0.000106	-0.000012	
* 3 years after	[-0.343]	[0.880]	[0.403]	[-2.008]	[0.941]	[-0.762]	
Treatment	0.000268	0.00011	0.000006	0.000003	0.000202	**-0.000019** **	-0.000034
Group	[0.605]	[1.280]	[0.327]	[0.217]	[0.952]	[-2.291]	[-1.051]
Obs.	2802	2423	4485	3723	3188	2550	221
R-squared	0.38	0.619	0.468	0.477	0.016	0.582	0.824

	Profits						
	[1] Small [5, 9]	[2] Sm-Med [10, 19]	[3] Medium [20, 49]	[4] Med-Lge [50, 99]	[5] Large [100, 199]	[6] Very lge [200, 999]	[7] Mega (1000+)
After treatment	-0.000045	0.000048	-0.000010	0.000073	-0.000156	**-0.000703** **	
*treated	[-1.122]	[0.348]	[-0.158]	[0.584]	[-0.780]	[-2.239]	
Treated	**0.000186** **	**-0.000227** **	-0.000007	-0.000062	-0.000275	0.000170	
* 1 year after	[2.377]	[-2.278]	[-0.077]	[-0.500]	[-1.066]	[0.731]	
Treated	**-0.000213** *	0.000012	-0.000153	-0.000007	**0.000263** *	0.000170	
* 2 years after	[-1.739]	[0.117]	[-1.310]	[-0.081]	[1.678]	[0.623]	
Treated	-0.000019	0.000016	0.000130	0.000012	0.000072	-0.000309	
* 3 years after	[-0.161]	[0.145]	[1.413]	[0.156]	[0.734]	[-1.124]	
Treatment	0.000090	**0.000111** *	-0.000012	0.000002	0.000014	-0.000032	
Group	[1.124]	[1.707]	[-0.346]	[0.040]	[0.203]	[-0.348]	
Obs.	1706	1335	2523	2215	1822	1435	
R-squared	0.963	0.652	0.455	0.445	0.616	0.691	

Table 11: Heterogeneous treatment effects of IUP on Turnover per worker and Turnover, by size

	Turnover per Worker (Turnover/L)						
	[1] Small [5, 9]	[2] Sm-Med [10, 19]	[3] Medium [20, 49]	[4] Med-Lge [50, 99]	[5] Large [100, 199]	[6] Very lge [200, 999]	[7] Mega (1000+)
After treatment	-0.000114	-0.000052	0.000016	-0.000006	0.000004	-0.000004	-0.000002
*treated	[-1.177]	[-1.435]	[1.207]	[-1.134]	[1.444]	[-0.557]	[-0.062]
Treated	**0.000258****	-0.00001	-0.000012	-0.000004	-0.000002	-0.000011	-0.000002
* 1 year after	[2.009]	[-0.800]	[-1.177]	[-0.652]	[-0.509]	[-1.205]	[-0.071]
Treated	0.000119	-0.000036	0.000009	0.000008	-0.000004	0.000007	
* 2 years after	[0.490]	[-0.803]	[0.654]	[1.396]	[-1.542]	[1.410]	
Treated	-0.000293	0.000005	-0.000011	-0.000001	-0.000002	-0.000001	
* 3 years after	[-1.371]	[0.097]	[-1.151]	[-0.158]	[-0.985]	[-0.144]	
Treatment	0.000005	0.000061	0.000014	0.000001	-0.000001	-0.000004	**-0.000016*****
Group	[0.068]	[1.527]	[1.266]	[0.235]	[-0.499]	[-1.024]	[-3.266]
Obs.	2,803	2,423	4,485	3,723	3,188	2,550	221
R-squared	0.140	0.909	0.810	0.881	0.875	0.806	0.660

	Turnover						
	[1] Small [5, 9]	[2] Sm-Med [10, 19]	[3] Medium [20, 49]	[4] Med-Lge [50, 99]	[5] Large [100, 199]	[6] Very lge [200, 999]	[7] Mega (1000+)
After treatment	-0.00004	**-0.000084***	0.000036	-0.000015	0.000023	0.000037	0.002079
*treated	[-0.721]	[-1.848]	[0.647]	[-0.366]	[0.472]	[0.102]	[0.949]
Treated	**0.000117****	-0.000012	-0.000025	-0.000049	0.000019	-0.000389	-0.003315
* 1 year after	[2.092]	[-0.817]	[-0.644]	[-1.085]	[0.407]	[-0.860]	[-1.154]
Treated	**-0.000108***	-0.000048	0.000027	0.000013	-0.000002	0.000141	0.000757
* 2 years after	[-1.760]	[-0.748]	[0.571]	[0.305]	[-0.059]	[0.864]	[0.626]
Treated	0	0.00001	-0.000058	0.000011	-0.000039	0.000172	0.000339
* 3 years after	[0.006]	[0.141]	[-1.228]	[0.255]	[-1.346]	[0.702]	[0.729]
Treatment	0.000037	**0.000106***	0.000046	0.000001	-0.000035	**-0.000174***	-0.000956
Group	[0.822]	[1.733]	[1.459]	[0.066]	[-1.541]	[-1.840]	[-0.994]
Obs.	3169	2423	4485	3723	3188	2550	300
R-squared	0.333	0.881	0.853	0.895	0.909	0.907	0.976

Table 12: Heterogeneous treatment effects of IUP on Export Outcomes and Value per unit of exports

	Exports						
	[1] Small [5, 9]	[2] Sm-Med [10, 19]	[3] Medium [20, 49]	[4] Med-Lge [50, 99]	[5] Large [100, 199]	[6] Very lge [200, 999]	[7] Mega (1000+)
After treatment	-0.000116	**-0.000181***	0.000058	-0.000061	0.000144	0.000279	0.006926
*treated	[-0.866]	[-1.703]	[0.447]	[-0.708]	[0.862]	[0.346]	[1.266]
Treated	**0.000282****	-0.00003	-0.00002	-0.000113	-0.000208	-0.000804	-0.010005
* 1 year after	[1.979]	[-0.894]	[-0.220]	[-1.212]	[-1.051]	[-0.766]	[-1.403]
Treated	-0.000141	-0.000092	0.000055	0.000067	0.000033	0.000165	0.002662
* 2 years after	[-1.026]	[-0.621]	[0.491]	[0.781]	[0.505]	[0.460]	[0.923]
Treated	-0.000102	0.000037	-0.000138	0.000042	0.000027	0.000267	0.000545
* 3 years after	[-0.687]	[0.226]	[-1.303]	[0.579]	[0.333]	[0.503]	[0.410]
Treatment	0.000052	0.000237	0.000111	0.000035	-0.000073	**-0.000531*****	**-0.004011***
Group	[0.489]	[1.646]	[1.547]	[0.984]	[-1.298]	[-3.140]	[-1.661]
Obs.	3,031	2,410	4,467	3,709	3,179	2,546	284
R-squared	0.035	0.900	0.849	0.869	0.812	0.841	0.977

	Value per Unit						
	[1] Small [5, 9]	[2] Sm-Med [10, 19]	[3] Medium [20, 49]	[4] Med-Lge [50, 99]	[5] Large [100, 199]	[6] Very lge [200, 999]	[7] Mega (1000+)
After treatment	0.000004	-0.000015	0.000004	-0.000001	-0.000001	**-0.000006***	**-0.000034****
*treated	[0.383]	[-1.221]	[0.391]	[-0.079]	[-0.238]	[-1.767]	[-2.020]
Treated	-0.000026	0.000007	-0.000025	0.000005	-0.000001	0.000002	**0.000035***
* 1 year after	[-1.242]	[0.828]	[-1.585]	[0.202]	[-0.476]	[0.362]	[1.760]
Treated	0.000042	-0.000004	0.00002	0.000003	-0.000002	-0.000006	
* 2 years after	[1.043]	[-0.330]	[1.560]	[0.264]	[-0.373]	[-1.238]	
Treated	-0.000017	0.000001	-0.000001	0.000014	0.000002	0.000008	
* 3 years after	[-0.489]	[0.150]	[-0.103]	[0.948]	[0.402]	[1.569]	
Treatment	0.000006	0.000008	-0.000002	-0.000001	0.000003	0.000003	0.000012
Group	[0.381]	[1.184]	[-0.260]	[-0.133]	[1.633]	[0.844]	[0.826]
Obs.	2396	1996	3816	3289	2818	2227	226
R-squared	0.939	0.991	0.863	0.801	0.929	0.846	0.963

Table 13: Treatment effects on Employment, wages, profitability and Profits by alternative size categories.

	Net Job Creation				Turnover per L			
	[1] Micro [1-5]	[2] Small [6-9]	[3] Medium [10-49]	[4] Large [>=50]	[1] Micro [1-5]	[2] Small [6-9]	[3] Medium [10-49]	[4] Large [>=50]
After treatment	0.000681	-0.000117	0.000066	-0.000035	-0.000193	-0.000085	0.000019	0.000006
*treated	[1.610]	[-0.890]	[0.410]	[-0.098]	[-1.119]	[-0.714]	[1.308]	[0.957]
Treated	-0.001427**	-0.000452	-0.000121	0.000401	0.000338	0.00023	-0.000024	-0.000007
* 1 year after	[-2.159]	[-1.317]	[-0.506]	[1.058]	[1.465]	[1.358]	[-1.354]	[-1.110]
Treated	0.000977*	0.000995**	0.000045	0.000538*	0.000226	-0.000165	0.00001	0.000003
* 2 years after	[1.958]	[2.150]	[0.174]	[1.766]	[0.719]	[-1.303]	[0.811]	[0.392]
Treated	-0.000166	-0.000455*	-0.000204*	-0.000662**	0.000029	-0.000189	-0.000016	-0.000007
* 3 years after	[-0.414]	[-1.952]	[-1.656]	[-2.462]	[0.102]	[-1.085]	[-1.365]	[-0.855]
Treatment	-0.000333	-0.000075	0.000317***	0.000242	-0.000009	0.000069	0.000025*	-0.000006**
Group	[-1.163]	[-0.554]	[3.425]	[0.826]	[-0.067]	[0.813]	[1.811]	[-2.015]
Obs.	1,914	1,520	7,460	9,903	1,156	1,423	7,132	9,682
R-squared	0.851	0.919	0.737	0.396	0.518	0.126	0.782	0.599

	Turnover				Firm Survival			
	[1] Micro [1-5]	[2] Small [6-9]	[3] Medium [10-49]	[4] Large [>=50]	[1] Micro [1-5]	[2] Small [6-9]	[3] Medium [10-49]	[4] Large [>=50]
After treatment	-0.000212***	-0.000042	0.000008	0.000029	0.012301	-0.006785	-0.018336**	-0.005363***
*treated	[-2.898]	[-0.607]	[0.157]	[0.397]	[0.773]	[-0.545]	[-2.425]	[-2.858]
Treated	0.000210***	0.000179	-0.000003	-0.00011	-0.012443	0.024143	0.013291	-0.002811
* 1 year after	[3.176]	[1.438]	[-0.072]	[-1.130]	[-0.709]	[1.192]	[1.489]	[-0.427]
Treated	-0.000066	-0.000128	0.000017	0.000034	0.004502	-0.006919	-0.005838	0.009059
* 2 years after	[-1.137]	[-1.381]	[0.382]	[0.862]	[0.394]	[-0.346]	[-0.547]	[1.228]
Treated	0.000065	-0.000131	-0.000047	0.000009	-0.005176	-0.021909	0.004489	-0.016252***
* 3 years after	[1.382]	[-1.176]	[-1.090]	[0.158]	[-0.411]	[-1.275]	[0.408]	[-3.071]
Treatment	0.000002	0.000036	0.000046	-0.000048*	0.041884***	0.040932***	0.026847***	0.020185***
Group	[0.042]	[0.676]	[1.597]	[-1.857]	[2.720]	[3.100]	[6.413]	[6.658]
Obs.	1,601	1,423	7,132	9,682	1,914	1,520	7,460	9,904
R-squared	0.596	0.325	0.848	0.916	0.044	0.051	0.030	0.017

Table 14: Treatment outcomes for Exports and Value per Unit, by alternative size categories

	Exports				Value per Unit			
	[1] Micro [1-5]	[2] Small [6-9]	[3] Medium [10-49]	[4] Large [>=50]	[1] Micro [1-5]	[2] Small [6-9]	[3] Medium [10-49]	[4] Large [>=50]
After treatment	0.012301	-0.006785	-0.018336**	-0.005363***	-0.000031**	0.000042	-0.000005	-0.000002
*treated	[0.773]	[-0.545]	[-2.425]	[-2.858]	[-2.030]	[1.531]	[-0.853]	[-0.303]
Treated	-0.012443	0.024143	0.013291	-0.002811	-			
* 1 year after	[-0.709]	[1.192]	[1.489]	[-0.427]				
Treated	0.004502	-0.006919	-0.005838	0.009059	0.000016	-0.000019	0.000023*	-0.000003
* 2 years after	[0.394]	[-0.346]	[-0.547]	[1.228]	[1.121]	[-0.358]	[1.921]	[-0.678]
Treated	-0.005176	-0.021909	0.004489	-0.016252***	-0.000009	0.000017	-0.000007	0.000009
* 3 years after	[-0.411]	[-1.275]	[0.408]	[-3.071]	[-0.699]	[0.734]	[-0.616]	[1.517]
Treatment	0.041884***	0.040932***	0.026847***	0.020185***	-0.000003	0	-0.000001	0.000002
Group	[2.720]	[3.100]	[6.413]	[6.658]	[-0.149]	[-0.000]	[-0.237]	[0.862]
Obs.	1462	1412	7100	9652	1,104	1,150	5,990	8,524
R-squared	0.504	0.027	0.844	0.876	0.928	0.981	0.848	0.803

Table 15: Indicators of Market Concentration

Gini, Theil's Entropy Index, and Thiel's Decomposition by treatment				
	GINI	GE(0)	GE(1)	GE(2)
2005	0.94533	4.35877	2.81526	16.16555
2006	0.93121	4.15509	2.61318	14.26525
2007	0.93743	4.43142	2.68034	15.1502
2008	0.92082	4.29535	2.40485	11.13297
2009	0.92128	4.08576	2.43914	11.96958
2010	0.92602	4.26168	2.53751	13.98232
	Between GE(1)	Within GE(1)	Between GE(2)	Within GE(2)
2005	0.05812	2.75714	0.0496168	16.11593
2006	0.06834	2.54484	0.0587316	14.20652
2007	0.1156	2.56474	0.0973379	15.05287
2008	0.10392	2.30093	0.08647	11.0465
2009	0.12832	2.31081	0.1092649	11.86031
2010	0.16404	2.37347	0.1377527	13.84457
	Control GE (1)	Treated GE (1)	Control GE (2)	Treated GE (2)
2005	2.823694	2.267654	15.12076	6.041585
2006	2.581956	2.298398	13.05273	6.724458
2007	2.569899	2.527124	12.75224	8.651509
2008	2.291784	2.374496	9.4886	7.440495
2009	2.301099	2.376101	9.80148	8.054179
2010	2.356615	2.501273	10.89955	9.322504

Table 16: Indicators of Product Concentration

Gini, Theil's Entropy Index, and Theil's Decomposition by treatment				
	GINI	GE(0)	GE(1)	GE(2)
2005	0.91884	3.57383	2.53157	16.72343
2006	0.92318	3.64043	2.58605	16.81002
2007	0.92229	3.66823	2.55396	15.28146
2008	0.93196	3.82093	2.84752	25.48601
2009	0.92217	3.68656	2.62719	18.51141
2010	0.92532	3.79645	2.65414	19.10999
	Between GE(1)	Within GE(1)	Between GE(2)	Within GE(2)
2005	0.0018	2.52978	0.00189	16.72154
2006	0.00002	2.58604	0.00002	16.81
2007	0.00195	2.55201	0.00186	15.2796
2008	0.00713	2.84039	0.00656	25.47945
2009	0.00287	2.62418	0.00302	18.50855
2010	0.01018	2.64396	0.00928	19.10071
	Control GE (1)	Treated GE (1)	Control GE (2)	Treated GE (2)
2005	2.53672	2.47872	17.42568	11.98901
2006	2.59353	2.53629	16.95802	15.83962
2007	2.56319	2.47047	15.44652	13.2552
2008	2.87848	2.53394	26.10005	14.15124
2009	2.64373	2.49276	18.86863	14.48558
2010	2.65729	2.54283	19.02241	15.63286

Table 17: Technology-intensiveness of goods (Lall 2000)

CATEGORY	EXAMPLES	Standard International Trade Classification (SITC) rev. 2
A. COMMODITIES		
Commodities	Fresh fruit, meat, rice, cocoa, tea, coffee, timber, coal, crude petroleum, gas, ore concentrates and scrap.	001, 011, 022, 025, 034, 036, 041, 042, 043, 044, 045, 054, 057, 071, 072, 074, 075, 081, 091, 121, 211, 212, 222, 223, 232, 244, 245, 246, 261, 263, 268, 271, 273, 274, 277, 278, 281, 286, 287, 289, 291, 292, 322, 333, 341.
B. MANUFACTURES		
Natural resource-based manufactures	Prepared meats/fruits, beverages, wood products, vegetable oils, base metals (except steal), petroleum products, cement, gems, glass.	012, 014, 023, 024, 035, 037, 046, 047, 048, 056, 058, 061, 062, 073, 098, 111, 112, 122, 233, 247, 248, 251, 264, 265, 269, 423, 424, 431, 621, 625, 628, 633, 634, 635, 641, 282, 288, 323, 334, 335, 411, 511, 514, 515, 516, 522, 523, 531, 532, 551, 592, 661, 662, 663, 664, 667, 681, 682, 683, 684, 685, 686, 687, 688, 689.
Low-technology manufactures	Textile fabrics, clothing, footwear, leather manufactures, travel goods pottery, simple metal structures, furniture, jewellery, toys, plastic products.	611, 612, 613, 651, 652, 654, 655, 656, 657, 658, 659, 831, 842, 843, 844, 845, 846, 847, 848, 851, 642, 665, 666, 673, 674, 675, 676, 677, 679, 691, 692, 693, 694, 695, 696, 697, 699, 821, 893, 894, 895, 897, 898, 899.
Medium-technology manufactures	Passenger vehicles and parts, commercial vehicles, motorcycles and parts, synthetic fibres, chemicals and paints, fertilizers, plastics, iron and steel, pipes and tubes, engines, motors, industrial machinery, pumps, ships, watches.	781, 782, 783, 784, 785, 266, 267, 512, 513, 533, 553, 554, 562, 572, 582, 583, 584, 585, 591, 598, 653, 671, 672, 678, 786, 791, 882, 711, 713, 714, 721, 722, 723, 724, 725, 726, 727, 728, 736, 737, 741, 742, 743, 744, 745, 749, 762, 763, 772, 773, 775, 793, 812, 872, 873, 884, 885, 951.
High-technology manufactures	Data processing and telecommunications equipment, television sets, transistors, turbines, power generating equipment, pharmaceuticals, aerospace, optical and instruments, cameras.	716, 718, 751, 752, 759, 761, 764, 771, 774, 776, 778, 524, 541, 712, 792, 871, 874, 881.
C. OTHER TRANSACTIONS		
Other	Electricity, cinematographics film, printed matter, special transactions, gold, coins, pets, works of art.	351, 883, 892, 896, 911, 931, 941, 961, 971.

Source: Sanjaya Lall, (2000) 'The technological structure and performance of developing country manufactured exports, 1985-98', Oxford development studies, 28(3), 337-69