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Human capital shortages in the Vietnamese industry. A firm-level analysis

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ABSTRACT

The access to human capital results to be a fundamental determinant of growth in LDCs enabling conditions for economic diversification and industrial upgrading. Skilled labour shortages generate detrimental dynamics for enterprise development preventing the spillovers arising from the productive interactions with the foreign agents and obstructing the domestic firms' capabilities to absorb knowledge and technology. At the same time, the presence of an inadequately skilled workforce is combined to a scarce degree of firms' responsiveness with respect to learning by exporting mechanisms and exploitation of R&D incentives. In this regards, firms are not likely to face undifferentiated human capital constraints. Indeed, the typology and the severity of the obstacles in terms of inadequately educated workforce are likely to be significantly determined by their observable and unobservable attributes. We implement binary discrete choice models on firms' subjective assessments to evaluate whether and to what extent the attributes of the firms matter in determining the degree of severity of the human capital constraints. The main results of our study, conducted on about 1000 firms in Vietnam, show that the indirect exporters, the firms investing in R&D and the firms located in urban contexts are more likely to report human capital shortages as a major constraint relative to the rest of the firms.

Keywords: Human capital, Emerging Markets, Industrial Policy, Vietnam, Entrepreneurship.

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c.MET Working paper 01/2017

February 2017

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1. INTRODUCTION

Since the beginning of the new Millennium, the World Bank makes a consistent effort in promoting and sharing a new development agenda with respect to the issue of economic growth in the East Asian context. Moving away from the Washington Consensus orthodoxy, the World Bank progressively spreads a renewed theoretical approach aimed at mitigating the *getting the price right* philosophy of the Nineties, resulted ineffective in explaining the heterogeneous economic performances in the Asian region.

In particular, to justify the slow and irregular convergence path of the Southeast Asian economies, the World Bank adopts the notion of *Middle-Income Trap* (Gill and Kharas, 2007; Kharas, Kohli, 2011; Agenor and Canuto, 2012). According to this interpretation, the catching up dynamic of the second and third tier NICs (New Industrialized Countries) of the region has been obstructed by a series of internal weaknesses mainly related to their institutional, infrastructural and education systems (Agenor et al., 2012; Hill et al., 2012; Lin and Treichel, 2012; Flaaen et al., 2014). In terms of policy implications, similar contributions stressed the necessity for the middle-income economies to enforce the aforementioned areas of weakness and provide a good business environment in order to fully benefit from the spillovers guaranteed by their integration in the global production system.

In this framework, the human capital endowment is widely considered as a particularly relevant *growth fundamental* given its important role in developing the middle classes' capabilities as an economy grows (Jimenez et al., 2012) as well as in favouring an efficient allocation of the economic resources and talents (Gries and Naude, 2010) and stimulating the process of structural transformation of a country towards more productive activities (McMillan, Rodrik, 2012; ADB, 2013).

Overall, the access to human capital also operates as an enabling condition for enterprise growth stimulating domestic and foreign investment (Youssef, 2001; Blomstrom, Kokko, 2003; Crespo and Fontoura, 2007). In this regards, it is worth mentioning that the shortage of adequately educated workforce is likely to discourage entrepreneurial operations and to undermine productive diversification activities.

The function of human capital as an engine of growth is still more significant in the Southeast Asian context, where the industrialization dynamics have been predominantly triggered by foreign capital inflows and directed towards the low cost production for external markets. Indeed, such type of specialization, based on low-end products, has exposed the Southeast Asian countries to persistent competitive pressures on labour cost and exports' demand (Yusuf, Nabeshima, 2009; Rasiah, 2010; Masina, 2010; Angelino, Masina, 2014). In this regards, it is worth highlighting that the absence of competitive human capital assets leads the domestic firms to benefit to a lower extent both from the opportunities of technological acquisition from imports and the vertical spillovers resulting from the productive interactions with the foreign agents (Abramovitz, 1986; Basu, Weil, 1998; Fu, Gong, 2011; Petti, Zhang, 2013; Di Tommaso et al., 2013; Rubini et al., 2015). At the same time, the presence of an inadequately skilled workforce is likely to reduce the upgrading mechanisms as it is generally combined to a scarce degree of firms' responsiveness with respect to *learning by exporting* mechanisms and exploitation of R&D incentives (Gill, Kharas, 2007).

It is a widespread view, in the prevalent economic development literature, that a similar scenario is currently materializing in Vietnam. In this perspective, the rapid growth process and the impressive structural change experienced by the country since the beginning of the Nineties would not be enough to lead the country towards a long-term path of convergence (Masina, 2012; McCaig, Pavcnik, 2013; Di Tommaso, Angelino, 2015). Conversely, the persistence of a series of structural problems, mainly related to the weakness of the education system and the

shortage of qualified workforce, risks to jeopardize the development process of the country (Perkins, Thanh Tu Anh, 2009; p. 35). As the Vietnamese economy becomes increasingly linked to the global markets, it needs to count on a pool of well-educated workforce resulting able to successfully face the challenges arising from a changing competitive environment (Schou-Zibell, Madhur, 2010; p. 14). In this framework, dealing with the human capital constraints appears to be a fundamental issue to create internal value and move up the value-added chain beyond the first stages of assembly production. In a productive context like the Vietnamese one, where the generation of internal value remains small and under foreign control, the accumulation of industrial human capital, supported by quality education and training, is likely to assume a crucial role in triggering virtuous circles between local assemblers and foreign suppliers favouring skills and knowledge internalization (Ohno, 2009). At the present stage of development, Vietnam needs to focus on the human capital development as a key point of its industrial competitiveness agenda. In this perspective, the central priorities to deal with seem to be the following: extending the access to education and addressing the territorial inequities in education outcomes; improving the quality and the learning outcomes of the education system to meet the increasing demand of adaptable workforce; strengthening the national innovation systems facilitating the coordination mainly between the education system, the large state-owned enterprises and the foreign-owned export firms (Kee-Cheok Cheong et al., 2010; p. 63). On this basis, the aim of enhancing the country's human capital endowment in conjunction with an upgrading of the industrial structure requires a comprehensive and well-targeted strategy action that harmonize the policies for promoting the skill formation with the rest of the interventions of trade, fiscal and institutional nature (Valila, 2006, pp. 9-10). In this framework, it is important to stress that in order to be effective the policy formulation has to follow a pragmatic approach moving beyond the traditional distinction between functional and selective interventions and relying on the interaction between incentives, capabilities and institutions, (Ohno, 2009; p. 32; Kee-Cheok Cheong et al., 2010, p. 216).

In a similar context, the design and the implementation of the human capital policies also needs to move beyond a *one-size-fits-all* reform approach providing for the lack of institutional support by means of the identification of appropriate policies, based on differentiated targets and formulated on the basis of the firm-specific constraints. In this regards, a key issue to investigate concerns the heterogeneity of the human capital constraints across economic agents. Looking at firms' constraints, for example, it is plausible that elements such as the dimension, the localization, the sector and the ownership significantly tend to diversify the nature and the severity of the obstacles faced by the firms themselves. In this perspective, exploring the complex interactions between the firms' characteristics and their constraints reveal to be a consistent instrument to interpret the demand of policy expressed by the entrepreneurs.

The empirical exercise presented in this paper has to be intended as an attempt of providing a small contribution towards this direction. Specifically, by means of a discrete choice model we try to estimate whether and to what extent a series of divergent observable characteristics of the Vietnamese firms matter in determining the severity of their human capital constraints.

This study is structured as follows. The next paragraph provides a historical review of the industrial development process in Vietnam taking into account the interventions aimed at enhancing the quality of the workforce. The third paragraph describes the data used and performs some descriptive statistics on the sample of Vietnamese firms. The fourth paragraph specifies the model and presents the estimation strategy. The fifth paragraph shows the results of the probit regression. Finally, the last paragraph discusses the conclusions and the overall implications related to the study.

2. HISTORICAL OVERVIEW AND POLITICAL REFORMS IN VIETNAM

Starting from the Nineties, Vietnam becomes protagonist of a pronounced process of economic growth and industrial development. Such a dynamic is combined to a transition from a planning economy, characterized by a centralized allocation of the resources, to a context that begins to progressively stand on market dynamics (Fforde and de Vlyer, 1996). In the late Eighties, as a result of the Six CPV Congress political turn, the Vietnamese government launches Doi Moi, a program of liberalization and market opening aligned to the neoliberal visions promoted by the Washington Consensus (Kokko, 1998; Boothroyd and Pham Xuan Nam, 2000; Beresford, 2008). Specifically, the Vietnamese government, moving away from the soviet-style statist orthodoxy, tends to converge on market-oriented institutional and regulatory models. The reforms promoted eliminate the public monopoly on foreign trade, provide SOEs with a higher managerial autonomy and allow the deployment of small scale private activity (Griffin, 1998; Masina, 2006). In the course of the Nineties Vietnam displays a simultaneous coexistence between market-friendly reforms and interventionist government measures. In this context, the public planning activity is relegated only to those industries (chemicals, metal products, cement, glass, motorbikes) considered functional to control the levers of the domestic policy-making. These sectors remains under the strict supervision of the Party and are protected through import substitution policies as well as non-tariff barriers (Athukorala, 2006). In 1995, the access into the ASEAN (*Association of Southeast Asian Nations*) captures Vietnam increasing economic interactions with the other regional players.

The negative shock provoked by the 1997-98 Asian crisis stimulates a reconfiguration of the regional production equilibria (Jomo, 2001; Borrus et al. 2000; Felker, 2003). In this new pattern, as a consequence of the low cost of labour force and lacking social and environmental restrictions, the latecomers of the Southeast Asian region, such as Vietnam, assume the role of manufacturing export hubs by attracting waves of FDI's directed to labour intensive and low value -added activities (Masina, 2010; Leproux and Brooks, 2004; Anwar and Nguyen, 2013).

In the first years of 2000s the Vietnamese government adopts a series of fiscal reforms aimed at improving the investment climate. In this framework, it is worth mentioning the reduction of tariff barriers in step with the WTO accession criteria (Athukorala, 2006: 161). In parallel, the government issues two *Enterprise Laws*, in 2000 and 2005, directed to simplify the bureaucratic procedures connected to the entrepreneurial activity as well as to uniform the tax regimes for public and private ownership (Perkins and Vu Thanh Tu Anh, 2007: 19; Thanh and Duong, 2011: 112-113). In the last years further liberalization reforms have been implemented culminating in the recent *Law on Enterprises* ("The New Law") and *Law on Investment*, entered into force in July 2015. Overall, these measures are likely to meet the requests of the foreign investors by improving Vietnam's business environment in terms of quality and efficiency making more flexible the corporate governance rules, reducing the number of industries subject to restrictions in foreign ownership and allowing the foreign enterprises to opt for international arbitrations in the dispute settlement mechanisms (Clifford Chance, 2015; Vietnam Briefing Dezan Shira&Associates, 2015).

In the same years, the Vietnamese government also promotes a series of planning documents aimed at directing the *outward-oriented* industrialization process towards the generation of internal capabilities.

In particular, the *Strategy for Socio-Economic Development 2001-2010* and the *Strategy for Socio-Economic Development 2011-2020* constitute the two pillars on which the different *Five-Year Plans* and the sectorial and territorial Masters Plan set down. In general terms, the *Strategy 2001-2010* is designed to convert Vietnam in an industrialized and modern country by

2020 (Strategy for Socio-Economic Development 2001-2010, p. 5). In order to realize such an ambitious goal, the plan adopts a series of incentives directed towards the transformation of the country's industrial mix. In this respect, it is possible to observe a diversified approach contemplating, at the same time, both export promotion and import substitution measures. Specifically, the strategy targets three different groups of industries: the industrial sectors which can benefit from a comparative advantage in the international markets (*agricultural, forest and aquatic product processing, garments, leatherwear and footwear, electronics and informatics, certain medical products and consumer goods*) the high capital intensive sectors and National Defense industry (*petroleum, metallurgy, mechanical engineering, basic chemicals, fertilizers, building materials*) the high-tech and high growth potential industries (*information, telecommunication, electronics and automation techniques*) (Vietnam Economic and Development Strategy Handbook, 2009, pp. 82-89).

These groups are supported by drawing upon alternative industrial policy instruments. With regard to the first group of industries, the plan promotes the implementation of export-oriented policies and the full mobilization of the productive resources in order to extend the competitiveness margins. Conversely, the second group, considered crucial for the national independence and economic self-sufficiency, is sustained through protectionist measures and selective policies. For what concerns the third group, this is promoted by adopting preferential regimes aimed at the acquisition of innovative and technological capabilities through the promotion of clustering policies and industrial parks (Vietnam Industrial and Business Directory, 2009, pp. 26-27).

In this framework, the Vietnamese government also promotes a series of additional plans to directly regulate specific industrial sectors (*Strategy for Chemical Industry Development to 2010, Strategy for Mechanical Industry Development to 2010, Strategy for Automotive Industry to 2010, Strategy for Power Development in the period 2004-2010, Strategy for Textile and Garment Development to 2010*) and target territorial zones (*Master Plan for Local industry development*). Indeed, the territorial specialization policies promoted by the government are conceived as an instrument to foster upgrading mechanisms in the labour-intensive sectors by providing incentives to industrial and export processing zones in the areas of Hanoi and Ho Chi Minh city (Strategy for Socio-Economic Development 2001-2010, p. 13).

In the wake of the previous planning program, the new *Strategy for Socio-Economic Development 2011-2020* recommends to:

“actively facilitate the transfer in the economic structure as well as the change in the growth model with first priority given to the quality, productivity, effectiveness and competitiveness; pay attention to the intensive development and a knowledge based economy” (Strategy for Socio-Economic Development 2011-2020, p. 4).

The document emphasizes the objective to upgrade the Vietnamese economic structure and promote a more inclusive and sustainable growth in terms of innovation, human capital and output quality. In addition, the development strategy is based on some *Decisive Thoughts for Industrial Development Strategies* aimed at: stimulating the development of strategic sectors and export industries, accelerating the country's modernization pace, renewing the innovative and technological capabilities of the production system, encouraging the participation of private sectors in the new generation industries, stimulating the dynamism in the small and medium enterprises (Ha Thi Hong Van, 2012, p.184).

In parallel, the strategy maintains a similar group categorization proposing again the same intervention modes for each of them. However, this time the first group, constituted by the comparative advantage export sectors, is subject to a “concentrated development strategy” aimed at intensifying production linkages in order to better engage the local supporting

industries (Strategy for Socio-Economic Development 2011-2020, p. 10). The capital-intensive industry group still benefits from protection and it is incentivized to develop cooperation alliances with strategic partners in order to acquire modern technologies. Finally, the third group, composed by the potentially innovative industries, is promoted by means of clustering policies and increasing investments in research and technology (Ibidem).

It is worth mentioning that the *Strategy* also calls for a progressive transfer of labour intensive industries towards the rural areas, accompanied by simultaneous efforts in concentrating the new manufacturing industries in proximity of big urban centers (Ha Thi Hong Van, 2012, pp. 186). Moreover, the Vietnamese government commits itself to increase the export production value added by stimulating the participation of local firms in the global value chains through a more selective approach related to the FDI attraction. In addition to this, it provides for other measures aimed at increasing the quality of production and the skills of the workforce, reducing the quantity of imported inputs, improving the local small firms' subcontracting and intensifying the backward linkages, developing and promoting local brands on the domestic markets (Vietnam's Strategy for Socio-Economic Development 2011-2020).

Contextually to the two *Strategies*, the Vietnamese government has promoted a series of specific directives intended to enforce the education systems aligning the quality of teaching, workforce training and applied research to the international standards. A similar strategy put emphasis on the skills' accumulation as a key priority supporting the rising entrepreneurs' demand for qualified workers as well as enabling the productive system to assimilate new technologies coming from FDIs, imported capital goods and other sources of innovation (WB/EASHD, 2008; Harman et al., 2010).

In this framework, the government's Resolution n. 14 launches the "Fundamental and Comprehensive Reform of Higher Education in Vietnam 2006–2020" (also known as the Higher Education Reform Agenda, or HERA). The document, issued by the MOET (Ministry of Education and Training), expresses the following general aim:

"To carry out fundamental and comprehensive reform of higher education; undertake a process of profound renews in the area of the quantity, quality and effectiveness in order to meet all the demands of industrialization, modernization, global economic integration and society's demand for learning opportunities. By 2020, Vietnam aims to have a higher education system that is advanced by international standard, highly competitive, and appropriate to the socialist-oriented market mechanism" (MOET, 2005)

It starts reporting a series of structural weaknesses related to the Vietnamese education and training system hampering the country's needs of industrial upgrading and modernization. Among these, the report stresses the following:

- poor quality of training, backward teaching methods and lack of international qualification of the academic staff;
- excessive focus on theoretical subjects and scarce orientation to markets' needs;
- low percentage of higher education students;
- insufficient orientation to research activities;
- limited financial resources in teaching and research;
- rigidity and lack of flexibility of the curricula;
- governance of higher education still follows the paradigms of a government controlled economy rather than a socialist-oriented market economy (MOET, 2005; p. 12).

Another significant issue, underlined by the WB, concerns the fact that government funding has to balance the promotion of advanced quality standards education hubs with the concomitant necessity of extending the access to education towards lower income groups and

peripheral regions. The effects of such trade-off often reflects in sectorial and territorial disequilibria between supply and demand of skilled workforce (WB, 2007). Further weakness related to the Vietnamese education system deal with the student/teacher ratios that exhibit higher scores compared to the rest of the Southeast Asian industrialized countries (Harman et al., 2010), the low levels of teacher job satisfaction, deriving from short term contracts and bad working conditions, the insufficient resources' equipment and the limited infrastructure and teaching facilities (WB/EASHD, 2008).

Overall, the guidelines promoted by HERA are based on several priorities related to the quality of the education activities, the redefinition of their ultimate goal, the governance structure and the overall management of the education system. First of all, HERA is explicitly intended to move education and training activities from being supply-based to being demand-driven. An increase in the degree of responsiveness of the education system towards local communities and economic agents is sustained through the introduction of new academic programs, structures and partnerships. In order to enhance teaching and management skills at school and university level, the strategy encourages the sharing of knowledge and practices introducing training abroad programs and promoting local and international networks (Harman et al., 2010). At the same time, the plan rearranges the financial incentives by including quality indicators and assessments in the allocation schemes. In parallel, it confers legal autonomy to the public higher education institutions attributing to them direct responsibilities for training, research, human resource management and public planning (MOET, 2006). For what concerns the structure of governance, the agenda provides for the elimination of line-ministry control on the higher education institutions and the establishment of community-based evaluation mechanisms involving unions and community groups especially in the process of adapting the educational programs to the career orientation (Welch, 2007).

In addition, the document reports a series of more specific objectives. Specifically, it indicates the aim of increasing higher education enrolment to reach 200 students per 10,000 population by 2010, and 450 students per 10,000 population by 2020; at the same time, it plans to reduce the student to teacher ratio below 20:1, in line with the standards of OECD countries. Overall, the plan also supports the creation of a national network of higher education institutions articulated in decentralized tasks and functions with the aim to trigger qualification mechanisms at both sectoral and territorial level (MOET, 2005).

In this context it is possible to situate the Vietnamese government stipulation of the Quality Improvement Grant (QIG) scheme, in partnership with the World Bank, aimed at enhancing the effectiveness of the universities' planning activities, projecting the teaching, learning and research training to international standards and supporting the development of education infrastructure (Dang, 2009). In particular, the scheme incentivizes Vietnamese universities to upgrade library systems, hardware, laboratories and teaching materials, to engage in innovative training frameworks including simulations, software and pilot classes, to strengthen ICT capacity and provide greater access to computer for staff and students and to enhance IT infrastructure and applications in teaching, research and management (WB, 2008).

The aforementioned human capital policy framework in order to result effective in its impact on the economic system needs to deal with a series of implementation challenges. In particular, as stressed before, it is necessary for the government to convert the traditional top-down approach into an interactive and flexible decision-making process that contemplates the heterogeneity in characteristics of the different social and economic agents. In this framework, our empirical attempt to identify the firms' differentiated demands of skilled workforce, through the analysis of their constraints, is likely to act as useful instrument to target responsive interventions to support the entrepreneurial system, on the demand side, and the education and training system on the supply side.

3. DATA AND DESCRIPTIVE STATISTICS

The dataset used in this research is WB's 2015 Vietnam Enterprise Survey. This is a questionnaire that collects data related to firms' characteristics, performances and various dimensions of business environment. The questionnaire contains data from 996 firms distributed in four regions (Red River Delta, North Central Area and Central Coastal Area, South East, Mekong River Delta) and it is structured in different sessions providing information about firm's size, sector, ownership, legal status, sales, sales destination, input origin, production activities and costs, innovation and training. In addition, the questionnaire reports data related to managers' subjective assessments about the major obstacle to business activity. Overall, there are fifteen dimensions of business environment including some relevant problems highlighted by the economic literature such as: access to finance, inadequately educated workforce, practices of competition in the informal sector, transport, political instability, corruption, tax rates, labour regulation. Herein we focus on the firms' human capital constraints taking into account the following question as posed to the managers:

- To what degree is *Inadequately Educated Workforce* an obstacle to the current operations of the establishment?

In this context, the respondent must choose one alternative among the following five ordered outcomes: "no obstacle", "minor obstacle", "moderate obstacle", "major obstacle", "very severe obstacle". The firms' responses associated to the degree of severity of the obstacle constitute the dependent variables that we examine in the econometric session by estimating their interaction with a series of covariates related to the firms' characteristics.

In this descriptive session, we also consider an additional question provided by the database concerning the firms' bigger obstacle. Looking at the firms' main obstacle, we notice that inadequately educated workforce result to be one of the most frequent constraints expressed by the respondents. Overall, 16.8% of the firms report this as their biggest obstacle (Tab. 1).

In this regards, it is worth stressing that the frequency of the outcomes substantially differs across firm's characteristics. If we analyse the frequency of the firms' main obstacles in relation to their size, for example, the dimension of inadequately educated workforce results to be the most recurring problem only across large firms while small and medium ones exhibit other types of obstacles (Tab. A1). At the same time, a heterogeneous distribution of the outcomes can be spotted taking into account the firm's status in terms of ownership. In this respect, the data show that human capital constraints result to be predominant as the biggest obstacle among foreign firms differently from domestic firms that show other concerns. Investigating the specialization of the firms with respect to sales destination, we observe that the firms that export or produce for export are more likely to report to be penalized by inadequately educated workforce, while the firms supplying the domestic market tend to stress other dimensions as their main problem (Tab. A3). Extending the analysis to the firms' geographical location, it emerges that while the firms located in the South East Region (including the main business center Ho Chi Min city) tend to report quality of workforce as their biggest obstacle while those located in the Red River Delta, North Central and Mekong River regions mainly express other types of constraints (Tab. A4). Finally, an analysis of the biggest obstacle across sectors shows that the firms situated in the export-driven garments industry report more frequently than the other (25,5%) the dimension of inadequately educated workforce as their most significant constraint.

Table 1: Frequencies and distribution of the main obstacles as reported by the firms

Biggest Obstacle Affecting The Operation Of This Establishment	Frequencies	Percentages	Cumulative Distribution
Access to finance	149	16.8	16.8
Access to land	66	7.44	24.24
Business licensing and permits	5	0.56	24.8
Corruption	32	3.61	28.41
Courts	4	0.45	28.86
Crime, theft and disorder	13	1.47	30.33
Customs and trade regulations	29	3.27	33.6
Electricity	33	3.72	37.32
Inadequately educated workforce	149	16.8	54.11
Labour regulations	43	4.85	58.96
Political instability	28	3.16	62.12
Practices of competitors in the informal	139	15.67	77.79
Tax administration	36	4.06	81.85
Tax rates	73	8.23	90.08
Transport	88	9.92	100
Total	887	100	

Focusing on our variable of interest, i.e. the firms' responses concerning the degree of severity of the human capital constraints, it is possible to stress additional findings taking into account the magnitude of the obstacle as reported by firms' ordered outcomes. The interaction of these data with a series of firms' attributes such as size, ownership, sales destination and location provides additional trends concerning the heterogeneity of the effects across firms' characteristics that are worth to be discussed (Tab.2, 3, 4, 5).

In this regards, it is important to observe that a higher share of large firms, relative to small and medium firms, find the quality of workforce as a consistent problem (moderate, major or very severe). At the same time, looking at the obstacle severity in terms of ownership, the foreign firms display a higher sensitivity with respect to human capital constraints than the domestic ones. A similar trend emerges considering the sales' destination, with the direct and mainly the indirect exporters resulting to find more problematic the shortages of skilled workforce relative to the firms producing for the domestic market. Finally, looking at the location, the data show that the firms situated in North Central areas as well as those located in the Southeast Region seem to be more affected than the others from the human capital constraints.

Table 2: Frequencies of the obstacles associated to the dimension of Inadequately Educated Workforce in terms of size

Degree of severity	Size			Total
	Small	Medium	Large	
Absent or Minor Obstacle	79.38	72.01	68.58	73.16
Moderate, Major, Very Severe Obstacle	20.62	27.99	31.42	26.84
Total	100	100	100	100

Table 3: Frequencies of the obstacles associated to the dimension of Inadequately Educated Workforce in terms of ownership

Degree of Severity	Ownership			Total
	Domestic	Foreign		
Absent or Minor Obstacle	73.43	70.45		73.16
Moderate, Major, Very Severe Obstacle	26.57	29.55		26.84
Total	100	100		100

Table 4: Frequencies of the obstacles associated to the dimension of Inadequately Educated Workforce in terms of sales destination

Degree of Severity	Sales Destination			Total
	Domestic Market	Direct Export	Indirect Export	
Absent or Minor Obstacle	79.38	72.01	68.58	73.16
Moderate, Major, Very Severe Obstacle	20.62	27.99	31.42	26.84
Total	100	100	100	100

Table 5: Frequencies of the obstacles associated to the dimension of Inadequately Educated Workforce in terms of region

Degree of Severity	Region				Total
	Red River Delta	North Central Area	South East Region	Mekong River Delta	
Absent or Minor Obstacle	73.56	60.48	79.94	75.18	73.16
Moderate, Major, Very Severe Obstacle	26.44	39.52	20.06	28.82	26.84
Total	100	100	100	100	100

4. EMPIRICAL STRATEGY AND MODEL SPECIFICATION

As mentioned before, our study is aimed at assessing whether and to what extent the different attributes of the Vietnamese firms of our sample are likely to have a divergent impact on the severity of their human capital constraints. Using the firms' responses about obstacle severity for the dimension of inadequately educated workforce we implement a probit estimation technique modelling the dependent variable on the basis of a binary outcome.

The probit model, based on maximum likelihood estimation techniques, is widely adopted in the economics and business micro-level literature to assess the probability of occurrence of a given event on the basis of a set of selected covariates of interest (Amemiya, 1981; Hoetker, 2007). The construction of the probit estimator makes use of a latent continuous dependent variable y_i^* and associates it to an observable binary variable y_i , which assumes the value of 1 (if the event occurs) or 0 otherwise. Furthermore, the assumption of normal distribution of the residuals allows for the utilization of the standard normal cumulative distribution function in the interpretation of the standardized probit index. In our specification, the vector X is constituted by the covariates specified in Table 6.

The outcome variable y_i is tested by estimating the firms' assessment about obstacle severity related to the inadequately educated workforce provided by the survey. Specifically, the firms' manager had the possibility to make one choice between five ordered outcome ("No obstacle", "Minor Obstacle", "Moderate Obstacle", "Major Obstacle", "Very Severe Obstacle"). In order to run a binary probit, we aggregate the five outcomes of each business environment dimension into a binary variable which takes the value of 1 "Significant Obstacle" if the outcome expressed by the firm corresponds to "Moderate Obstacle", "Major Obstacle", "Very Severe Obstacle" and 0 "Minor or Non-Significant Obstacle" otherwise.

Table 6: List of the selected covariates

Categorization	Variables
Firms' basic characteristics	<ul style="list-style-type: none"> - <i>firmage</i>: it is a continuous variable that represents the number of years elapsed since the company started its operations up to 2015. - <i>small</i>: it is a dummy variable and takes the value of 1 if the firm employs less than 10 and 0 otherwise. - <i>public</i>: it is a dummy variable and takes the value of 1 if the firm shows 50% or more of public ownership and 0 otherwise. - <i>foreign</i>: it is a dummy variable and takes the value of 1 if the firm shows 50% or more of foreign ownership and 0 otherwise.
Firms' competitiveness	<ul style="list-style-type: none"> - <i>direxport</i>: it is a dummy variable that takes the value of 1 if the relative majority of the sales' share is directly exported. - <i>indirexport</i>: it is a dummy variable and takes the value of 1 if the relative majority of the sales' share is supplied to a firm that exports and 0 otherwise. - <i>inputorig</i>: it is a dummy variable and takes the value of 1 if the firm purchases inputs from abroad and 0 otherwise. - <i>r&d</i>: it is a dummy variable and takes the value of 1 if the firm has spent on formal research and development activities over the last three years and 0 otherwise.
Firms' localization	<ul style="list-style-type: none"> - <i>urban</i>: it is a dummy variable and takes the value of 1 if the firm is located in a city with a population greater than 1 million. It is used only in the first specification. - <i>hanoi</i>: it is a dummy variable and takes the value of 1 if the firm is located in Hanoi and 0 otherwise. It is used only in the second specification. - <i>hochimin</i>: it is a dummy variable and takes the value of 1 if the firm is located in Ho Chi Min city and 0 otherwise. It is used only in the second specification.
Firms' sector	<ul style="list-style-type: none"> - <i>sector</i>: it is composed of nine sectors: food, textiles and garments, wood and paper products, heavy industries, machinery&equipment and electronics, construction, wholesale, retail and hotel&restaurants, other services. The reference sector is food. The aggregation has been structured in order to capture the differences in the effects between different types of industries such as: labour-intensive low value added inward-oriented (e. g. food) labour-intensive export-oriented manufacturing (e. g. textiles and garments), resource-based labour-intensive manufacturing (wood and paper products), capital-intensive inward-oriented manufacturing (Heavy Industries), high value-added manufacturing (machinery&equipment and Electronics), other inward-oriented industries and services (construction, wholesale, retail).

5. RESULTS

In this session we present and analyse the results obtained from the regressions of the model specified before. Table 7 displays the results of the probit regression of the selected covariates on the firms' subjective assessments related to their human capital constraints. In this regards, we decided to adopt two different specifications. In the first one, we included a set of covariates associated to firms' basic characteristics and competitiveness indicators. In the second one, we introduced two locational dummies related to the capital city Hanoi and the main business center Ho Chi Min as well as the factor variable *sector* to catch the variation at sectorial level. The table reports the marginal and the impact effects of the coefficients, as they have an easier interpretation relative to the raw coefficients in terms of standardized probit index. As a result of this, the coefficients reported in the table capture the regressors' effects on the probability for a firm of reporting a business constraint as a "moderate, major or very severe obstacle".

Looking at the result obtained from the first specification, it is possible to observe a series of differentiated effects. In the first place, the small firms tend to be less likely to be affected by human capital shortages, *ceteris paribus*, relative to the bigger ones. On the other hand, data show that the firms having invested in research and development activities are more likely to consider the lack of qualified workforce as a consistent obstacle relative to the rest of the firms. At the same time, indirect exporters also exhibit a positive coefficient suggesting that local providers producing for international markets report more frequently consistent human capital constraints. The significance of the coefficients associated to the previous parameters seems to define a framework where the lack of qualified workforce represents a primary concern mainly for the firms dealing with foreign markets' competitive pressures. This is also confirmed by the positive even if slightly insignificant coefficient on the importers prefiguring a tendency to be affected from human capital shortages.

A similar scenario is consistent with the literature stressed in the previous paragraphs highlighting the role of human capital accumulation in fostering productivity growth, knowledge spillovers and processes of learning by exporting and technology absorption from inputs. An additional issue arising from these results concerns the question of the "missing middle", frequently emphasized in the literature related to entrepreneurship in developing countries (Tybout, 2000; Krueger, 2013). Our results show that a definite typology of firm (medium or large, producing for exports, dynamic in terms of innovative activity, located in urban areas) is more likely to report human capital shortages as significant obstacles to the business activity. At the same time, our results exhibit insignificant coefficients on foreign owners and direct exporters. On this basis, by exclusion, it is possible to target a short frame of the productive characteristics associated with firms' human capital shortages. Specifically, these seem to be Vietnamese internationalized suppliers importing foreign inputs and providing goods to direct exporters.

The second specification, in most cases confirms and strengthen the aforementioned results. Specifically, the positive coefficient of R&D activity and indirect exports becomes even more significant as is the negative coefficient on small firms. In addition, it emerges that the firms located in the capital city Hanoi are approximately the 20.7% more likely to indicate the lack of adequately educated workforce as a consistent obstacle. Analysing the effects at sectorial level, we obtain interesting results that somehow confirms the previous picture. In particular, the export-led labour-intensive sectors, such as textiles, garments and leather, display a very high and significantly positive coefficient relative to the inward-oriented reference sector (food). Similarly, the capital-intensive heavy industries and the export-oriented higher value-added sectors (Machinery, Transport Equipment and Electronics) also report a higher propensity to face human capital constraints.

Table7: Marginal and Impact Effects of Firms' Characteristics on Obstacle Severity - Probit Model Specification

Independent Variables	Inadequately Educated Workforce	
	(1)	(2)
<i>firmage</i>	-0.002* (-1.71)	-0.002 (-1.39)
<i>small</i>	-0.088*** (-2.59)	-0.082** (-2.34)
<i>public</i>	0.136 (1.20)	0.151 (1.29)
<i>foreign</i>	-0.013 (-0.22)	0.001 (0.03)
<i>directexport</i>	0.004 (0.02)	0.018 (0.049)
<i>indirectexport</i>	0.082* (1.69)	0.112** (2.31)
<i>inputorig</i>	0.046 (1.55)	0.042 (1.15)
<i>r&d</i>	0.131*** (4.06)	0.108*** (3.32)
<i>urban</i>	0.109*** (2.77)	
<i>hanoi</i>		0.207*** (3.79)
<i>hochimin</i>		0.062 (1.22)
<i>sector_labintens</i>		0.112*** (2.38)
<i>sector_heavy</i>		0.160*** (3.24)
<i>sector_eo</i>		0.139** (2.06)
Log Likelihood value	-514.508	-493.412
Pseudo R ²	0.0467	0.0852
Obs.	928	927
P-value	0.000	0.000

* Significant at 10% level **significant at 5% level *** significant at 1% level.

P-values in brackets. Marginal effects are computed for the continuous variables. Impact effects are computed for dummy variables and factor variables.

6. CONCLUSIONS

The access to human capital results to be a fundamental determinant of economic growth and enterprise development in LDCs enabling conditions for economic diversification and industrial upgrading. This trend is particularly significant in the Southeast Asian context, where the industrialization dynamics have been predominantly shaped by the interests of foreign capital exposing the local economies to persistent competitive pressures on labour cost and exports' demand. In this framework, the absence of competitive human capital assets is likely to obstruct the domestic firms' absorption of technology and to prevent the spillovers resulting from the productive interactions with the foreign agents. In parallel, the presence of an inadequately skilled workforce is generally combined to a scarce degree of firms' responsiveness with respect to *learning by exporting* mechanisms and exploitation of R&D incentives. Our study focuses on Vietnam, a country that in the last decades has experienced a significant economic transition towards a market-friendly context combined to a series of reforms aimed at improving the country's business environment. In the last years, the Vietnamese government has promoted a series of specific directives intended to enforce the education systems aligning the quality of teaching, workforce training and applied research to the international standards. Nevertheless, in order to address the rising entrepreneurs' demand for qualified workers the new human capital policy framework needs to contemplate the heterogeneity in characteristics of the different social and economic agents.

In this regards, firms are not likely to face undifferentiated human capital constraints. Indeed, the typology and the severity of the obstacles in terms of inadequately educated workforce is likely to be significantly determined by their characteristics with respect to size, ownership, internationalization, innovation activities, sectorial and geographical locations and other observable and unobservable attributes. In this framework, our empirical attempt adopts a binary discrete choice model on firms' data and subjective assessments to evaluate whether and to what extent the firms' characteristics matter in determining the degree of severity and the nature of their human capital shortages. The results of our study, conducted on about 1000 firms in Vietnam, show some important trends. First, it is possible to find that indirect exporters and firms investing in R&D, as well as the firms located in Hanoi, are more likely to indicate inadequately educated workforce as a major constraint. At the same time, the small firms report to be less affected from human capital shortages. In addition, the firms operating in internationalized labour-intensive (textile, garments, leather), capital-intensive (heavy industries) and higher value-added sectors (machinery, transport equipment, electronics) are more likely to indicate lack of skilled workforce as a problem relative to the inward-oriented food industry. The aforementioned findings suggest an increasing demand of skilled labour from the most dynamic and innovative domestic firms facing the challenges associated to the international competition without benefiting from a direct interaction with external markets.

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APPENDIX

Table A1: Frequencies of the main obstacles as reported by the firms in terms of size

Biggest obstacle affecting the operation of this establishment	Size			Total
	Small	Medium	Large	
Access to finance	17.37	18.61	13.81	16.8
Access to land	9.65	8.06	4.48	7.44
Business licensing and permits	0.00	0.56	1.12	0.56
Corruption	3.86	2.78	4.48	3.61
Courts	0.39	0.56	0.37	0.45
Crime, theft and disorder	1.93	1.11	1.49	1.47
Customs and trade regulations	1.54	3.33	4.85	3.27
Electricity	3.47	4.72	2.61	3.72
Inadequately educated workforce	9.65	14.44	26.87	16.8
Labor regulations	3.86	5.83	4.48	4.85
Political instability	3.47	2.22	4.1	3.16
Practices of competitors in the informal x administration	20.85	14.44	12.31	15.67
Tax rates	9.65	8.61	6.34	8.23
Transport	10.81	10.56	8.21	9.92
Total	100	100	100	100

Table A2: Frequencies of the main obstacles as reported by the firms in terms of ownership

Biggest Obstacle Affecting The Operation Of This Establishment	Ownership		
	Private Domestic	Foreign	Public
Access to finance	17.47	6.67	30.77
Access to land	7.68	6.67	0
Business licensing and permits	0.62	0	0
Corruption	3.35	5.00	15.38
Courts	0.50	0	0
Crime, theft and disorder	1.36	3.33	0
Customs and trade regulations	3.22	5.00	0
Electricity	3.97	1.67	0
Inadequately educated workforce	15.37	35.00	15.38
Labor regulations	4.83	6.67	0
Political instability	3.10	5.00	0
Practices of competitors in the informal	15.99	8.33	30.77
Tax administration	3.84	5.00	0
Tax rates	8.30	8.33	0
Transport	10.41	3.33	7.69
Total	100	100	100

Table A3: Frequencies of the main obstacles as reported by the firms in terms of sales destination

Biggest Obstacle Affecting The Operation Of This Establishment	Sales Destination			Total
	Domestic	Direct Export	Indirect Export	
Access to finance	17.61	11.22	15.56	16.8
Access to land	7.93	7.14	0	7.44
Business licensing and permits	0.54	0	2.22	0.56
Corruption	3.49	5.1	2.22	3.61
Courts	0.54	0	0	0.45
Crime, theft and disorder	1.48	1.02	2.22	1.47
Customs and trade regulations	2.82	7.14	2.22	3.27
Electricity	3.63	2.04	8.89	3.72
Inadequately educated workforce	14.38	30.61	26.67	16.8
Labor regulations	5.24	4.08	0	4.85
Political instability	2.02	7.14	13.33	3.16
Practices of competitors in the informal	16.67	11.22	8.89	15.67
Tax administration	4.17	3.06	4.44	4.06
Tax rates	8.6	5.1	8.89	8.23
Transport	10.89	5.1	4.44	9.92
Total	100	100	100	100

Table A4: Frequencies of the main obstacles as reported by the firms in terms of regions

Biggest Obstacle affecting the operation of the establishment	Region				Total
	Red River Delta	North Central Area	South East Region	Mekong River Delta	
Access to finance	20.30	16.32	12.05	21.77	16.8
Access to land	10.53	3.68	9.45	1.61	7.44
Business licensing and permits	0.75	0	0.65	0.81	0.56
Corruption	3.76	3.68	3.91	2.42	3.61
Courts	0.00	0.53	0.33	1.61	0.45
Crime, theft and disorder	0.38	2.11	2.61	0.00	1.47
Customs and trade regulations	3.38	2.63	4.56	0.81	3.27
Electricity	2.63	4.74	3.26	5.65	3.72
Inadequately educated workforce	13.16	16.32	16.94	25.00	16.8
Labor regulations	3.01	3.16	8.79	1.61	4.85
Political instability	4.14	1.05	4.56	0.81	3.16
Practices of competitors in the informal	15.41	22.11	13.68	11.29	15.67
Tax administration	4.14	6.32	2.61	4.03	4.06
Tax rates	7.14	7.89	7.49	12.90	8.23
Transport	11.28	9.47	9.12	9.68	9.92
Total	100	100	100	100	100