

I. ARTICLES

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**INFLUENCE OF HUMAN CAPITAL ON FIRMS'
AND NATIONS' PERFORMANCE.
A BI-DISCIPLINARY LITERATURE REVIEW¹**

Human capital theories have been developed in the last decades. The concept has been extended to the fields of economics and management and there are now clearly different approaches between these fields. In this article we narrow the gap between these different approaches, considering the contribution of human capital to the performance of nations and firms. This an innovative bi-disciplinary study of the effects of human capital on the economic performance in the broad sense, reviewing simultaneously the literature that relates human capital to economic growth, the literature that relates human resources within the firm to firms' performance, with special focus on the quantitative predictions of different studies. From this we draw possible paths for future research in the economics and management fields. One of the most significant paths identified is the potential of using certain new variables to be collected at the macro-level that are already used at the management level.

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INTRODUCTION

Contemporary economies are today facing a number of key problems such as globalization, and growing worldwide competition, faster technological advances, and other factors which influence their competitiveness and, in turn, their natural development. Current theory of

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human capital and its influence on growth and firm performance suggests that enhancing human capital may, under certain conditions, contribute to countries' and firms' success.

Human capital and human resources theories have undergone much change in recent decades (e.g. Pigou in the 1920s, Becker and Schultz in the 1960s and Mincer in the 1970s), in the fields of both economics and management. However, there are clearly different approaches between these two areas of knowledge regarding human capital issues.

Within and between countries the effect of human capital in explaining growth and income has been subject to an interesting controversy. While from the standpoint of theory, human capital has been described as an important reason for differences in growth and income, empirically, only some measures of human capital are statistically related to growth, especially when one controls for outliers in the samples or when one considers specific sub-groups of countries.

The relationship between human capital and organizational performance has been explored through a number of conceptual frameworks, such as the resource-based view of the firm, the resource dependence theory, and the institutional theory. Traditionally viewed as a production factor to be minimized, human resources are more and more considered as a sustained source of competitive advantage that competitors cannot easily replicate. Current theory of human capital and its influence on company performance suggests that a strategic approach in human capital enhancement may contribute to organizational success. However, in terms of the importance of human capital-related variables in organizational performance, outcomes of empirical research are inconsistent, in which often one variable is found to be significant in a specific context, while in another, the link is not statistically significant.

In this article we seek to narrow the gap between both approaches, considering the contribution of human capital to the wealth of nations and firms. We review the main contributions of human capital to the growth and wealth of countries and firms in the theoretical and empirical literature, pointing out sensitive issues such as measurement problems affecting human capital in both macro and micro studies. One of the most important contributions of the article is to summarize the quantitative results that come from the different empirical approaches and to critically analyze them.

This article begins with a review of the main literature on human capital theory, growth, and development, which we link with the leading empirical contributions. We then review the literature that addresses the impact of human capital-related variables with performance among the management

literature. Finally, we critically analyze both views in a section that suggests avenues for future research in both areas.

1. HUMAN CAPITAL IN THE MACROECONOMIC THEORY

One of the first issues to deal with in human capital is its separation from raw labour. Human capital is distinguished from raw labour by its higher return, which compensates the additional investment needed to acquire human capital. This is the Mincer (1974) approach. Without additional assumptions, this approach does not lead to any relationship between human capital and economic growth. Some additional assumptions that recover this Mincerian approach and a close relationship to growth will be analysed later in this section.

In addition, differing from raw labour, human capital has also another crucial feature: it is 'accumulable', which means that someone can invest to obtain more and more human capital. An issue that also deserves discussion is whether this growth in human capital can last forever. The Ben-Porath model was one of the first models to incorporate a law of motion for human capital. With an accumulable human capital and with constant returns to scale in human capital we can obtain an AK-environment, in which growth lasts forever. Lucas (1988) had recovered this concept by proposing a model in which allocations of human capital through different sectors are rivals, and the model thus reveals that human capital can explain steady economic growth. This approach has seen an exponential development in the literature.

The consideration of human capital along with other factors of growth increased its importance as a source of complementarities in the process of economic growth. Rebelo (1991) presents a model with human and physical capital in which he noticed that society will experience the highest productivity if there is a balance between these two types of capital. Also, the fact that it is reasonable to assume that human capital is relatively more intensive in human capital (as input) than in physical capital yields the interesting conclusion that a recovery from a situation in which human capital is destroyed is lengthier than a recovery from a situation in which physical capital is destroyed. This is a conclusion with interesting policy implications, especially as it opens an avenue of research about the systems that protect human capital from depreciating. Some related literature appeared relating this issue with fertility and mortality rates (see e.g. Kalemli-Ozcan et al., 2000). However, the relationship between different types of risk and human capital has been developed only empirically (e.g. Sequeira and Ferraz, 2009; Sequeira, 2009).

There are two main groups of possible reasons to think that human capital can encompass several pecuniary or technological externalities. First, human capital can affect the overall productivity of the economy, reflecting the importance of having more embodied knowledge in societies. Second, through the use of bargaining power, an increase in the human capital of some workers can increase the wages of all workers.

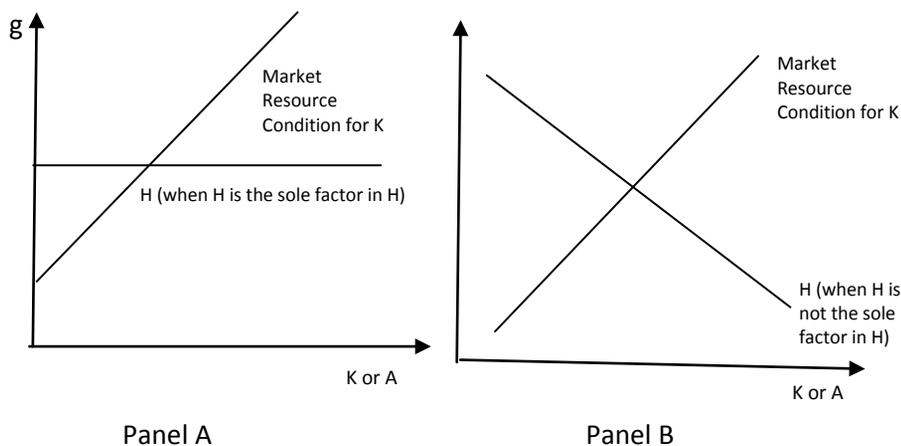
From the effects of human capital studied in the most recent literature we wish to emphasize those that derive from the interaction with R&D. In the models that consider a simple separation between human capital and raw labor the impact of interacting with R&D is crucial. R&D uses human capital to be produced (e.g. Grossman and Helpman, 1991) and as R&D is the source of growth in these models, human capital is the indirect source of growth. An increase in human capital decreases the wages at which the R&D sector hires human capital. This allows R&D firms to hire more workers and to produce more R&D, which will increase growth. There is also the possibility that the mix of low-tech and high-tech human capital affects economic growth (e.g. Sequeira, 2007, and Tsai et al., 2010).

In the models that followed the Ben-Porath-Lucas tradition, there are two important issues to be taken into account: does the human capital technology (only) use human capital? Is the depreciation of human capital related to R&D?

Regarding the first question, one must emphasize the case in which human capital is a source of growth in a model with several assets and is produced with human capital with constant returns to scale, meaning that human capital increases through allocation of some ‘teachers’ to schools and that the increase in teachers is proportional to the increase in students or graduates. In fact, in this case (e.g. Arnold, 1998), the only source of growth is human capital, which implies that the productivity parameters linked with R&D (also presented in the economy) do not influence the economic growth rate. The same reasoning applies to policies: subsidies to schools (or publicly financed schooling) increase economic growth while subsidies to the R&D activity are neutral in terms of economic growth. This has a very strong policy implication. Thus, some authors such as Dalgaard and Kreiner (2001), Zeng (2003), and Sequeira (2008), include other factors as inputs to human capital accumulation, providing effects of R&D in equilibrium growth rates. This happens as the return of human capital becomes dependent on returns from other sectors and thus one needs to recur to the returns conditions of the R&D or the capital sector to determine the economic growth rate.

The following figures (adapted from Zeng, 2003) show why the use of alternative inputs in the production of human capital is crucial to obtain an

effect of R&D or investment incentives in economic growth. On the vertical axis, there is the economic growth rate. Each line represents the resource constraint in the human capital sector (horizontal in Panel A and negatively sloped in Panel B) and the resource constraint in the other sector (which can be R&D or Investments sector). When the human capital sector uses only human capital as an input, the human capital sector resource restriction is sufficient to determine the economic growth rate (Panel A). Thus subsidies or taxes to R&D (which would move the positively sloped curve) do not affect economic growth. On the contrary, when human capital also depends on other factors such as inputs, movements of the positively sloped curve would change the equilibrium growth rate. A growth effect of an R&D subsidy in Panel B would be represented by a movement of the positively sloped curve to the left.



Source: from the authors

If the depreciation of human capital is related to R&D, we are dealing with an erosion effect. Erosion effects in endogenous growth models have been introduced by Sequeira and Reis (2006) and several extensions have been analyzed (see Reis and Sequeira, 2007, Sequeira, 2008, and Gómez, 2011). The presence of an erosion effect can explain the evolution of the composition of human capital, namely the decrease of proportion of the high-tech human capital in the developed countries, the economic growth slowdown after the last technological revolution (related to the widespread

use of computers), and also a higher probability of overinvestment in R&D (decreasing the belief that subsidizing R&D would be an optimal policy).

2. THE EMPIRICAL EFFECTS OF HUMAN CAPITAL IN ECONOMIC GROWTH

The burgeoning interest in the effect of human capital on economic growth began with the seminal article of Lucas (1988). Mankiw, Romer and Weil (1992) showed that the presence of human capital in a Solow Model would be essential to replicate a reasonable share of physical capital in the national income. Only six years after Lucas (1988) seminar paper, Benhabib and Spiegel (1994) cast doubts on the significant and positive effect of schooling on economic growth. This became one of the most cited articles in the literature. Following that, many contributions emphasized the measurement issues that affect human capital and can potentially affect this relationship. Three strands of research deserve mention. The first seeks to determine the influence of human capital on growth, total factor productivity (TFP) or unemployment and wages. The second aligns the estimations of the relationship between human capital and growth to the existing models. The other found sub-groups of countries in which there is a positive effect of human capital on economic growth.

The first strand focused on determining the influence of human capital on growth and highlighted its statistical significance. The leading articles are summarized in Table 1, where we conclude that the literature has been consolidating the positive and significant effect of human capital on growth and TFP. The use of a human capital stock or years of schooling variable as a proxy for human capital seems to be the most popular approach to evaluate the influence of human capital on growth. Temple (1999) concluded that the non-significant effect of human capital on growth reported by Benhabib and Spiegel (1994) was due to the presence of outliers, and presented compelling evidence for a positive and significant coefficient of human capital once outliers are dropped from regressions, achieving high significances for a broad set of countries and using a variable of stock of human capital. Subsequently, the literature has concluded that the positive effect of human capital on growth always depends on certain other covariates, namely specific country features. Mauro and Carmeci (2003) showed that the positive effect depends on unemployment in OECD. Sequeira and Martins (2008) complemented the former evidence with results according to which

not only education but also its public funding have a positive effect on growth subject to a given level of unemployment, a result that holds worldwide. Rogers (2008) concluded that the significance and quantitative importance of the effect of education on growth depends on certain country features such as corruption, black market, foreign exchange and brain drain, pointing out that countries that use education productively can benefit from it. Apergis et al. (2009) find a positive and significant result of education on TFP considering cross-country and cross-industrial analysis.

In the second group, the channels through which education affects economic growth are studied by Engelbrecht (2003) in the OECD countries. The author showed evidence that supports the direct influence of human capital on growth (the Lucas approach) and the indirect influence of human capital on growth through its positive influence on technology (the Nelson-Phelps approach). This conclusion has also been supported by Glaeser (1994). However, this work showed evidence according to which the channel from schooling to schooling explains to a large extent why schooling influences economic growth. One related issue is the one of causality between schooling and growth. Some argue that the estimated effects are obtained more from the reverse causality from growth to schooling than from the effect of schooling on growth. A good reference on this issue is Bils and Klenow (2000), who, on the basis of a Mincerian-type model, estimate that the channel from schooling to growth, although significant, represents nearly 1/3 of the total correlation.

In the third group, based on the Schumpeterian paradigm, Aghion and Howitt (2006) argue that differences between education sectors (secondary versus university) explain the differences in the growth performance between Europe and the United States in recent decades, an argument also endorsed by Krueger and Kumar (2004) who consider general versus vocational education. This argument rests on the fact that an emphasis on university education favours only nations that are close to the technological frontier. Jones (2008) argues that a knowledge trap occurs in economies where skilled workers boast broad but shallow knowledge as only deep and specialized skills can help the country to push the frontier of knowledge. Kriechel and Pfann (2005) applied this line of thinking to study the role of specific and general human capital after displacement of workers, analyzing the impact of specific and general knowledge in the wage losses during displacement. All of these contributions stress that the effect of education on growth may be positive subject to certain circumstances, namely the institutions present in different countries. In terms of policy lessons, a

country should invest in education not necessarily heavily, but taking into account its own institutions and its distance to the technological frontier.

Table 1

Human Capital Variables in Growth, Productivity and Wage Regressions

Human Capital Variable	Dependent Variable	Max. Sign. Level	Method	Dataset	Author
Human capital stock (estimated through years of education)	Output growth rate	5%	OLS	Different samples of world countries	Benhabib and Spiegel (1994)
Human capital stock (estimated through years of education)	Output growth rate	1%	LTS	Different samples of world countries (excluding outliers)	Temple (1999)
Years of education	TFP	1%	OLS	OECD countries	Engelbrecht (2003)
Completed level of education	Duration of unemployment, wage differentials	1%; 5%	Weibull Model	Displaced workers of a single firm	Kriechel and Pfann (2005)
Years of higher education; education spending	Output growth rate	1% (conditional on proximity to tech. frontier)	OLS/TOLS	World countries and USA states	Aghion and Howitt (2006)
Enrolments and years of education	Output growth rate	1%	GMM	OECD countries	Mauro and Carmeci (2003)
Enrolments and years of education	Output growth rate	1%	GMM	Different samples of world countries	Sequeira and Martins (2007)
Years of education	Output growth rate	1%	TOLS	Different samples of world countries	Rogers (2008)
Years of education	TFP	1%	FMOLS	21 industries, across OECD countries	Apergis et al. (2009)

Source: table elaboration from the authors

3. THE IMPORTANCE OF HUMAN CAPITAL IN FIRMS' PERFORMANCE

3.1. Strategic approach of Human Capital enhancement

A common issue in the different definitions is that human capital is an advantageous resource that is dependent on the collective intelligence of organizational collaborators and that the skillful use of such resources may improve organizational performance (Lim et al., 2010). While traditionally viewed as a factor to be minimized, human capital is increasingly seen as a valuable asset to be developed (Friedman et al., 1998). The concept of

human capital generally refers to all initiatives pursued to attract, develop, deploy, and retain collaborators (Pfeffer, 1994). More specifically, human capital refers to the combined knowledge, competencies, experience, creativity of the workforce, attitudes, and motivations (Gates and Langevin, 2010; Ployhart and Moliterno, 2011) embedded in firms' collective capability to extract the best solutions from everyone (Seleim et al., 2007).

Widely used in management literature, the concept of Human Capital sees people not as a perishable resource to be consumed, but as a potent, unique, and sustained source of competitive advantage that competitors cannot replicate. Current theoretical/empirical research on the effects of human capital and HRM policies/practices on companies' performance has been a significant issue in a number of fields such as human resource management, organizational strategy, and organizational applied psychology, among others, and suggests that a strategic approach in human capital enhancement may foster organizational success.

Moreover, the relationship between human capital and firms' performance has been explored through several alternative and/or complementary conceptual frameworks, and most of both theoretical and empirical research has been grounded in the resource-based view of the firm (RBV), which provides a theoretical bridge between the fields of strategy and strategic human resources management (SHRM). In fact, RBV has been successful in stimulating considerable progress in the SHRM arena, helping to put "people" on the radar screen, and issues such as knowledge, dynamic capability, learning organizations, and leadership as sources of competitive advantage turn attention toward the intersection of strategy and HR concerns (Wright et al., 2001).

During the last two decades, RBV has earned much attention among academicians (e.g. Barney, 1991; Grant, 1991; Hart, 1991; Peteraf, 1993; Wernerfelt, 1984) as a framework for explaining how organizations may gain sustained competitive advantages. At the root of RBV is the belief that firms may add value while creating competitive barriers, when holding resources not easily bought or copied, and are described as valuable, rare, inimitable, and non-substitutable (e.g. Barney, 1991). As a result, a firm's internal resources and competences (skills, capabilities, organizational characteristics, know-how, attitudes, knowledge, etc.) are viewed as a basis for ensuring a sustained competitive advantage. Grounded on the awareness that people's skills and expertise greatly influence the creation and use of knowledge in learning processes (Argyris and Schon, 1978), the extensive literature on human capital suggests that in order to expand the knowledge base and improve their performance, firms should invest seriously in

attracting, developing, and retaining talent (Lin and Wang, 2005; Snell and Dean, 1992).

The growing interest in SHRM has led to a large body of literature addressing the influence of HRM activities on firms' performance and suggesting critical HRM practices which are expected to ensure specific attributes in human resources that may provide competitive advantages (e.g. Ahmad and Schroeder, 2003; Huselid, 1995; Saénz, 2005; Theriou and Chatzoglou, 2009). From the several attempts to integrate HRM practices into firms strategic orientation, proponents of the 'universalistic approach' (e.g. Delaney and Huselid, 1996; Huselid, 1995; Pfeffer, 1994) maintain that organizations should embrace a "best practices" perspective of HRM and advocate that this set of practices always provides superior results, whatever the circumstances.

For example, Pfeffer (1998) highlights a bundle of practices that firms should pursue in order to improve performance through the management of their human capital: *(i)* employment security, *(ii)* selective hiring of new personnel, *(iii)* self-managed teams and decentralization of decision-making as the basic principles of organizational design, *(iv)* comparatively high compensation contingent on organizational performance, *(v)* extensive training, *(vi)* reduced status distinctions and barriers, including dress, language, office arrangements, and wage differences across levels, and *(vii)* extensive sharing of financial and performance information throughout the organization.

There is widespread agreement that such best HRM practices (or "high performance work practices", "strategic HRM practices", among other terms) have the capability to improve performance and, that firms should identify and develop such practices accordingly. Growing attention has been paid in recent years to the role of HRM in adding value to organizations, and a number of both theoretical and empirical investigations have linked HRM practices to firms' performance. A few studies report results less significant; for example, Gooderham's et al. (2008) findings indicate that, if a few practices have a significant impact on performance, the overall effect of HRM on performance seems relatively modest.

Nevertheless, a number of works do report significant results regarding the effects of HRM practices on performance. For example, consistent with the resource-based view of the firm, Hatch and Dyer (2004) show that investment in firm-specific human capital really has a significant impact on learning and performance. The research carried out by Ahmad and Schroeder (2003) provides overall support for Pfeffer's (1998) seven HRM practices

and empirically validates an ideal-type HRM system. Focusing on HRM practices such as training and development, teamwork, compensation/incentives, HR planning, performance appraisal, and employment security, Lee et al. (2010) find that all six HRM practices considered are positively related to performance. Findings from Huselid (1995) indicate that systems of High Performance Work Practices do have a significant influence on both intermediate employee outcomes (turnover and productivity) and short- and long-term measures of corporate financial performance. Finally, Wang et al. (2008) argue that in order to improve the skills of organizational members and their interpersonal relationships, investments in absorption, maintenance, and stimulation of human capital are highly related with organizational performance improvements, whether or not a business can maintain sustainable growth.

However, while HRM practices may be a source of competitive advantage, unique practices *per se* are not the main aim of SHRM; rather, the goal is to generate a comprehensive, high-quality stock of HR capital and leverage it in such a way that it enhances organizational processes and outcomes (Carmeli and Schaubroeck, 2005).

Apart from the 'universalistic approach', three alternative perspectives have been discussed in the literature. Several researchers (e.g. Lengnick-Hall and Lengnick-Hall, 1988; Youndt, et al., 1996) follow a 'contingency approach' and stress that in order to really optimize results, HRM practices and policies must be consistent and aligned within the overall strategy. Regarding the 'configurational approach', specific configurations of HRM practices may be determinant to improve effectiveness (depending on organizational contexts), and contribute to goals achievement (e.g. Delery and Doty, 1996; Guest and Hoque, 1994; Meyer et al., 1993b). Delery and Doty (1996) highlight the importance of developing a system that reaches a horizontal and vertical fit and determining the most effective mixes of practices to maximize performance outcomes; the authors explain that horizontal fit relies on the internal consistency between HRM policies and practices, and vertical fit depends on the congruence of the HRM system with the others systems of the organization.

Finally, the 'contextual perspective' proposes a broader model, suitable in several environmental contexts, representing a clear shift in the development of SHRM theory. Based on the idea that contextual factors affect and are affected by HRM policies and strategies, this paradigm, unlike others, is idiographic, focusing on understanding what is contextually unique and why (Brewster, 1999).

All four approaches center on different dimensions in SHRM research, although several researchers argue that, balancing the main contributions and limitations, it is possible to integrate all these propositions into a single explanatory model. For example, based on the idea that SHRM requires multidisciplinary, multi-paradigmatic, and multidimensional analytical frameworks, Martín-Alcázar et al. (2005) propose an explanation that surpasses the organizational level, integrating HRM in the macro-social framework with which it interacts.

3.2. Assessment of the influence of human capital on performance

Despite the growing worldwide and substantial interest in measuring both efficiency and effectiveness of HRM practices and policies through a reliable set of metrics for human capital, and assessing its influence in the overall performance, the literature still has reached no consensus regarding what indicators should be considered in this set of metrics. Usually performed through economic literature, human capital assessment has addressed mainly cost measures (e.g. salaries, training and development expenses, added value per employee) and some more traditional non-accounting measures (e.g. gender, average age, average training hours, average years in organization, professional tenure, years in actual function, educational level, turnover rate, years of experience, average overtime, experience in industry).

Moreover, considering the great diversity of the different human capital indicators proposed and used throughout the literature for research purposes, there is a clear need to group them into subsets according to their affinities. Accordingly, based on the literature review, the several indicators were classified into two broad dimensions: (i) knowledge and competencies, and (ii) attitudes and motivations. Knowledge and competencies involve such indicators as age, average training hours, average years in organization, years of experience, years in actual function, educational level, experience in industry, and others less conventional such as level of learning orientation, innovativeness and creativity of employees, and ability to work in a team. Attitudes and motivations include metrics such as turnover ratio, loyalty of employees, level of organizational commitment, motivation index, level of employees' job satisfaction, and empowerment index, among others.

3.2.1. Knowledge and competencies

Regarding the influence of human capital in organizational performance, the results of empirical research are quite inconsistent, and specific variables are often extremely important in a particular context and in other circumstances, relationships are not statistically significant. However, although empirical evidence about the influence of knowledge and competencies variables on performance measures is somewhat mixed, a number of studies do show significant relationships. Table 2 summarizes the results of several studies that provide empirical evidence for a significant influence of metrics on performance.

Table 2
Knowledge and competencies-based variables and firms' performance

Human Capital Variables	Dependent Variable	Max. Sign. Level	Method	Data set	Author
Ability to translate customer needs into programming	Export intensity (<i>ratio of export business to total production</i>)	5%	Stepwise regression	Sample of Egyptian software firms	Seleim, Ashour, and Bontis (2007)
Training in project management		5%			
Ability to work in a team		0,1%			
Education	Profitability	5%	Chi-squared	Sample of small and medium-sized tourism ventures in Ghana	Saffu et al. (2008)
	Monthly income	5%			
	Sales Turnover	0,1%			
Previous entrepreneurial experience	Profitability	5%			
	Monthly income	0,1%			
	Sales Turnover	5%			
Mean age (years)	Log (value added per employee)	1%	OLS	Sample of private-sector firms in Denmark with at least 20 employees	Grund and Westergaard-Nielsen (2008)
Mean education (in months)		1%			
Mean tenure (in years)		1%			
Training on job skills (<i>Construct assessed on a scale of three items</i>)	Operational Performance (<i>single performance index based on five areas of performance compared to competitors</i>)	1%	Hierarchical regression analysis	Sample of plants from automobile, electronics, and machinery industries, operating in Germany, Italy, Japan, and the USA	Ahmad and Schroeder (2003)
Training in multiple functions (<i>construct assessed on a scale of five items</i>)		1%			
Percentage trained (<i>basic sales</i>)	Sales volume per employee	0,1%	Hierarchical	Sample of stores	Russel et al. (1985)

<i>training</i>)	Image (<i>management and staff</i>)	0,1%	regression		
Professional training (<i>total training expenses divided by number of professionals</i>)	Total revenues (<i>minus total expenditures</i>)	1%	Multiple regression	Sample of audit firms in Taiwan	Chen et al. (2008)
Training	Perceived organizational performance(<i>measured by items such as customer satisfaction</i>)	1%	Regression analysis	Sample of firms from the National Organizations Survey (NOS).	Delaney and Huselid (1996)
	Perceived market performance(<i>measured by items such as growth in sales</i>)	5%			
Founder level of education	Founder firm performance(<i>earnings, net worth, cash flow, market share, and sales volume</i>)	5%	Regression analysis	Sample of U.S. founder-managed firms	Segal et al. (2010)
Founder managerial experience		1%			

Source: table elaboration from the authors

Regarding the influence of employees' age on firms' performance, although results reported in the literature seem quite inconclusive, evidence from different countries suggests that firms' performance tends to describe an inverted U-shaped relationship with age. While it may be true that younger employees usually have an up-to-date educational background, it may be also true that they are generally less professionally experienced than older ones. On the contrary, although older employees' physical performance may usually be lower than younger ones', they may benefit from greater professional experience. In fact, while some researchers including Morales and Marquina (2009) in Spain and Peru, report non-significant results, others find positive relationships between age and firms' performance. Examining the relationship between age and firms' value added per employee, for example, Grund and Westergaard-Nielsen (2008) find that both mean age and dispersion of age in firms are inversely U-shaped related to firms' performance.

Training is generally considered as a key factor in providing the knowledge and competences that may help to build and develop an effective workforce and improve organizations' performance, and as a result, several investigations have sought to evaluate this hypothetical relationship, finding strong support for it (e.g. Chen et al., 2008; Delaney and Huselid, 1996; Russel et al., 1985; Seleim et al., 2007; Switzer and Huang 2007). For

example, based on a sample of plants from automobile, electronics, and machinery industries operating in Germany, Italy, Japan, and the USA, Ahmad and Schroeder (2003) find positive empirical evidence for the relationship between both training in job skills (three-items scale) and training in multiple functions (five-item scale), and organizational performance, assessed through a single performance index based on five areas of performance compared to competitors. Examining the relationship between training measures and performance in a sample of retail stores, Russel et al. (1985) show that the percentage of trained employees is highly correlated with sales volume per employee. In some specific industries such as software development requiring higher levels of specialized know-how, findings also suggest strong evidence for the influence of training in organizations' performance. For example, the research conducted by Seleim et al. (2007) on a knowledge-intensive industry in Egypt shows a significant positive relationship between the number of software developers who received training in project management and performance (measured by export intensity). The findings of the study carried out by Chen et al. (2008), highlight that the performance of audit firms that provide high professional training is significantly better compared to audit firms with low professional training, suggesting that professional training brings a positive contribution to the operations of audit firms.

As recognized by several authors (e.g. Becker, 1993; Hitt et al. 2001), individuals with higher educational levels demonstrate a higher propensity to develop intellectual capabilities and knowledge that may support them in strategic decision-making and allow greater performance outcomes in most business environments. However, senior managers or founders are generally the focus in most of the research conducted to analyze the influence of education on performance. For example, a survey conducted by Segal et al. (2010) shows that firms in which founders have higher levels of education generally reach higher performance results in terms of market share, sales growth, and profitability, among other efficiency/effectiveness indicators. These findings are largely corroborated by several investigations (e.g. Mengistae, 2006; Sapienza and Grimm, 1997), suggesting that founders' educational level has, in fact, a significant positive effect on firms' performance.

It is generally assumed that employees who have longer professional experience tend to benefit from historical background that may create value to the organization. As a result, experience is extremely valued, mainly in the hiring process. However, considering the effect of 'years of experience'

in firms' performance, empirical results are apparently contradictory. While some studies identify negative correlations in specific industries, especially in knowledge-based businesses, like software development (e.g. Seleim et al., 2007), other investigations, such as Horowitz and Sherman (1980) in naval services, show that experience is one of the critical factors that influences productivity. Nevertheless, most of the research focused on the workforce in general report non-significant relationships between experience and performance, or even negative effects in some contexts. Regarding functions with higher levels of organizational responsibility (e.g. partners, entrepreneurs, and founders), results of several investigations identify a clear positive relationship between years of experience and performance (Colombo and Grilli, 2005; Segal et al., 2010). For instance, Pena (2002) shows that entrepreneurs' level of experience is positively associated with firms' survival and growth, and Steiner and Solem (1988) report owners' managerial background and experience as a significant contributor to the success or failure of small businesses.

3.2.2. Attitudes and motivations

Considering the effects of human capital indicators focused on attitudes and motivations in firms' performance, empirical findings are also inconsistent. Nevertheless, in spite of such mixed results, several studies do find significant relationships between human capital and various performance measures. Table 3 shows the results of some works that provide significant evidence in support of such relationships.

Table 3

Attitudes and motivations-based variables and firms' performance

Human Capital Variables	Dependent Variable	Max. Sign. Level	Method	Data set	Author
Turnover(<i>percentage of total turnover – 3 months</i>)	Customer service(<i>Score based on perceptions of stores environment and customer service interactions</i>)	1%	OLS	Sample of Borders stores from Fortune 500 retailer of entertainment products	Ton and Huckman (2008)
	Profit margin(<i>operating income divided by sales</i>)	1%			
Employee motivation	Productivity	1%	OLS	Sample drawn from compact disclosure	Huselid (1995)
	Tobin's q	1%			
Turnover	Productivity	5%			

	Tobin's q	1%		database	
Turnover (quit rate)	Overall financial performance (<i>assessment of workplace's financial performance as compared to other establishments in the same industry</i>)	5%	OLS	Data from the 2004 cross-section British Workplace and Employee Relations Survey (WERS)	Brown, Garino, and Martin (2009)
Organizational commitment (<i>construct assessed by 3 dimensions: willingness to exert considerable effort on behalf of the organization, strong desire to maintain membership in the organization, strong belief in and acceptance of organizational goals and values</i>)	Sales Volume	5%	OLS	Sample of German and Austrian executives	Steyrer, Schiffinger, and Lang (2008)
	Return on Investment	5%			
	Earnings growth	1%			
Organizational commitment (<i>construct assessed by 3 dimensions: affective, continuance, and normative</i>)	Return on Assets	1%	MANOVA	Sample of companies listed on the Kuala Lumpur Stock Exchange	Rashid, Sambasivan, and Johari (2003)
	Return on Investment	5%			
Job satisfaction (<i>Construct assessed on a scale of nine items</i>)	Organizational performance (<i>construct assessed through a scale of 16 items</i>)	1%	OLS	Sample of international hotels from Taiwan	Hwang and Chi (2005)
Job Satisfaction	Return on Assets	5%	OLS	Sample of manufacturing firms from nine major cities in China	Zhou et al. (2008)
Satisfaction	Store performance(<i>profit</i>)	5%	OLS	38,513 employee surveys from 107 groceries superstore	Keiningham et al. (2006)
Job satisfaction (<i>fair remuneration, job situation satisfaction, and overall satisfaction</i>)	Organizational performance(<i>financial performance, service performance, and behavior performance</i>)	1%	SEM analysis	Sample of non-life insurers in Taiwan	Shiu and Yu (2010)
Motivation (<i>index constructed upon both motivating, and demotivating variables</i>)	Working time spent productively (%)	5%	Stepwise regression	Sample of bricklayers on 12 sites in the UK	Ololomaiye (1990)

Source: table elaboration from the authors

As reported by a number of studies, at the organization level, turnover may involve considerable additional hiring and training costs, while at the individual level, new jobs may demand the acquisition of new skills. In fact although a few researchers, for example Brown et al. (2009), highlight that turnover may actually improve firms' performance (since new employees may be more highly motivated, better educated and more highly skilled), a number of empirical works suggest that higher turnover is generally linked to lower performance results. The research conducted by Ton and Huckman (2008) shows that increased employee turnover is related with a lower store performance, due to operational disruption from employee departures, additional work that must be absorbed by remaining employees, and the loss of tacit knowledge and accumulated experience held by departing employees. Findings also suggest that turnover has a nonlinear effect on performance, with low-turnover stores (where employees generally have a higher level of accumulated experience) being more affected by turnover than their high-turnover counterparts. Such results are corroborated by several other researchers, including Meier and Hicklin (2008), who find that while turnover is inversely related to performance for firms' primary goal, it does have the hypothesized nonlinear relationship for a secondary output that is characterized by greater task difficulty. Similar results have also been obtained by McElroy et al. (2001). Nevertheless, it is worth pointing out that according to Argote and Epple (1990), turnover may matter essentially in firms where jobs are not standardized and procedures do not exist for transmitting knowledge to new members.

While traditional HRM practices based on higher control are believed to have a negative influence on organizational performance, findings from several investigations like Déniz and De Saá (2003) or Roca-Puig (2007), suggest that commitment-oriented HRM practices lead to better performance outcomes. Indeed, usually defined as employees' psychological attachment to their workplace (e.g. Allen & Meyer, 1990), organizational commitment is the focus of extensive research concentrating on the relationship with issues such as job performance, turnover, and other motivational outcomes. The results of those studies usually provide evidence that a human resource system based on commitment awareness results in higher productivity in particular, and better organizational performance in general (Huselid, 1995; Meyer et al., 1993a; Rashid et al., 2003; Steyrer et al., 2008).

Workforce may be motivated through a number of concerns, such as recognition, enjoyment at the workplace, responsibility level, involvement in decision-making, sense of justice, and opportunities for personal growth. As

stressed by Vroom (1990), factors like employees' needs, beliefs, and rewards, among others, are major issues in workforce motivation. Indeed, although motivation drivers may vary from individual to individual, levels of motivation are generally higher when employees perceive that management invests in them both emotionally and financially, and cares about their welfare. Moreover, employees' motivation is generally seen as positively influencing corporate culture, providing intangible but equally important outcomes. As a matter of fact, most empirical research shows that a motivated workforce is related with higher performance. For example, the study performed by Prasada Rao (2006) demonstrates that the implementation of multi-factor group incentive schemes designed for motivating employees to improve productivity in manufacturing units leads effectively to a highly motivated workforce, higher production levels, and better consumption of raw materials. The research carried out by Olomolaiye (1990) finds statistical evidence that although motivation does not seem to influence the rate of working, it clearly influences the percentage of working time spent productively.

Job satisfaction may be described as the gap in expectation between employees' actual gain and what they think they deserve (Porter and Steers, 1973), and most scientific research shows that a satisfied workforce is generally related with higher performance. Indeed, in the last few decades, much research has focused on whether satisfied employees lead to higher performance or not, but the results are contradictory. Although it seems understandable that satisfied employees may be more devoted to their work and exhibit greater commitment and better individual performance, some authors find no relationship between job satisfaction and organizational performance (e.g. Keiningham et al., 2006; Rodrigues and Pinho, 2010), and even negative correlations between both indicators (Pritchard and Silvestro, 2005; Silvestro, 2002). However, several studies find significant statistical support for the positive influence of employees' job satisfaction in firms' performance (Hwang and Chi, 2005; Nebeker et al, 2001; Shiu and Yu, 2010; Zhou et al., 2008). For example, based on a sample of firms from the non-life insurance industry in Taiwan, Shiu and Yu (2010) find that employees' job satisfaction (measured on a scale organized in three dimensions: fair remuneration, job situation satisfaction, and overall satisfaction) positively affects organizational performance (including financial performance, service performance, and behavior performance). A survey conducted by Zhou et al. (2008) in Chinese firms shows that

employee's job satisfaction (measured on a five-item scale) fosters organizational performance (measured by return on assets).

4. CONCLUSIONS: AN OVERVIEW OF THE RELATIONSHIPS BETWEEN MACROECONOMIC AND MANAGEMENT THEORY

We performed an innovative bi-disciplinary study of the effects of human capital on the economic performance in the broad sense, reviewing on one hand the literature that relates human capital with economic growth, and on the other hand, the literature that relates firms' human resources with firms' performance. In this final section, we wish to emphasize the differences between these approaches and take lessons from one to the other. Table 4 summarizes what we think to be the main differences.

Table 4

Main differences in human capital approaches (macroeconomic view vs management view)

	Scope	Significance
Macroeconomics	Attempts to calculate broad measures for human capital	Statistical significance is obtained only under certain conditions
Management	Different concepts that can be considered proxies of human capital	Statistical significance is obtained only with some of the variables

Source: table elaboration from the authors

The main difference between the approaches resides in scope, and this is due to their nature. While in economics, human capital is usually treated as a broad asset that influences overall productivity in the economy, often in more than one sector, in management there are different points of view toward human resources, from the resource view to the best practices view. This is the first lesson from a macroeconomic perspective: a path through more heterogeneity in the treatment of human capital. Some progress has already been made, as some different types of human capital have been considered, namely schooling, experience, quality of human capital, and technical and non-technical human capital. The greatest heterogeneity is also seen in the number of variables that are usually taken as determinants of firms' performance when compared with the number of variables used in macroeconomic literature.

A common result from the macroeconomic and management approach is that the effect of human capital on growth is positive and significant, but only under certain conditions, and only regarding some specific variables. Outliers' exclusion, composition, and different channels are important to

obtain a positive effect of human capital on economic growth, while training, commitment, and schooling (of the manager or founder) seem to be the most significant and positively related variables in firm-based research.

In the empirical macroeconomic literature, the number of schooling years is undoubtedly the variable mostly linked with human capital when researchers seek to evaluate the relationship between human capital and growth. However, some attempts have been made to relate quality of schooling, experience, and different types/levels of human capital/schooling years with economic growth. Some variables considered in management studies, such as workplace satisfaction, competency, job stability, and commitment are, by now, out of the macroeconomics scope. This is our second lesson. Some of these indices can be collected in each country in a systematic way, by directing questionnaires to families and firms. We are convinced that this can be a fruitful line of research. Incorporating some of these concepts in the modeling of human capital, both in the macroeconomy and within firms, is also one of our suggestions for the future.

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