

The Earnings of workers by their Fields of Choice in Trinidad and Tobago.

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Abstract

This study examines the impact that workers' field of study or choice, may have on his earning capacity in Trinidad and Tobago. Using individual persons' data from the Continuous Sample Survey of the Population (CSSP), for the period 1991-2015, the returns of private and public sector workers is estimated by employing the Quantile Regression technique. This study finds that the wage returns of workers in most fields under examination have worsened during 2004-2015. Workers employed in low-, and high-income jobs for most fields such as science, engineering, and architecture, benefitted from better returns in 2004-2015, when compared to other fields in the social sciences such as business. While the returns of middle-income workers in most fields declined in 2004-2015. This outcome may be due to changes in the skill set of workers, industry demand, digitalization of the labor market, and the intensification of both Skilled Biased Technical Change (SBTC) and Job Polarization.

Keywords: *Human Capital, Quantile Regression, Skilled Bias Technical Change (SBTC), Science Technology Engineering and Mathematics (STEM), Job Polarization.*

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Introduction

The most important economic decisions that have the potential to alter a worker's career trajectory, is the area of expertise or, fields which they choose to study at either a senior secondary, or tertiary level of education (Bartolji and Polanec, 2012). While most of the education economics literature focuses on the human capital earnings of workers associated with their years and level of schooling, the literature tends to view workers as capable of choosing their future level of education with little uncertainty about completing their chosen programme. Here in lies the problem as explained by Altonji (1993, 49), where "most of the literature on returns to education ignores the large differences in earnings by field, and the fact that choice of (academic) major often changes during college." Bearing in mind the fact that workers major academic field of study is likely to change throughout his career, there are several variables which may influence their decision. Some of these include their taste for school, and for higher education, as well as their ability, and capability to undertake a course of study towards the award of a particular degree programme, the expected payoffs/earnings to be made after a year of completing the programme, the economic environment of their domestic or home economy, and their ability to access funding to pursue higher education (Altonji, Bloom and Meghir, 2012).

This research is motivated by the fact that the country in which the worker resides tends plays a great role in his ability to access funding, opportunities to study different areas of specialities, and job opportunities in the industry with which he finds himself employed. Bearing in mind that Europe was one of the first regions to develop a modern economic system through

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the commercialization of their industries, i.e., agricultural, minerals, and manufacturing. It is likely that their successful modernization of these industries, may have led to significant “trickle-down effects,” from tax breaks, and other financial benefits offered to large businesses, entrepreneurs, and investors to stimulate economic growth of their education sector. As a result, countries in Western Europe, i.e., specifically France, Germany, and the Netherlands, can offer several forms of financial relief to their workers and students (EU, 2021). For example, in France, family allowances, tax deductions, housing aid, financial support for university catering, social services grants, supplementary scholarships, and mobility funding are provided. While in Germany, support is provided under the Federal Training Assistance Act, Educational Credit programme and Student Loan Programme and Grants. Finally, in the Netherlands, assistance for higher education through basic and supplementary grants, public transport passes, interest-bearing loans, and the Netherlands-Flanders Accreditation Organisation (NVAO).

Unlike these three European countries, Trinidad, and Tobago like many Small Island Developing States (SIDS), rely heavily on its Petroleum, Tourism and Manufacturing industries for revenue and foreign direct investment. This limited source of revenue, together with the economic uncertainty created by the 2009-2015 economic recession, puts immense strain on the main provision of higher educational funding, i.e., Government Assistance for Tuition Expenses Programme (GATE) programme for recipients. Given that the economic environments of Trinidad and Tobago is quite different to that of economically developed regions such as Europe and the United States (US), it became necessary to examine the extent to which the earnings of workers in Trinidad and Tobago vary by their academic field of choice, to add greater dept to the literature which reflects the labour market experiences of the developing world, and more specifically the Caribbean region.

A brief examination of current research reveals that most of the literature in this area is focused primarily on that of developed countries, mostly Europe, the US and Canada. In the case of Europe, Swedish workers in STEM fields and business were found to earn significantly higher earnings, than those in Social Sciences, Humanities and Vocational Programmes. These changes were attributable to college major and occupation, but most interestingly the field ultimately chosen by those particularly at the secondary level, was influenced by the gender of their siblings, and the intergenerational effects from parents to their sons (Dahl, Rooth, and Stenbery, 2020a, 2020b). This therefore leads to significant long-term consequences for occupational segregation and gender wage gaps. Further investigation into the gender-specific impact of field of study choices in Germany, reveals that male students tend to apply to more lucrative majors based on information on the wage returns, while this has no effect on the decisions of female students (Finger, Solga, Ehlert, and Rusconi, 2020). The earnings of Canadian graduates tend to however, be influenced by their credentials within fields, and their gender, as Canadian women appear to earn less five years after graduating, as opposed to men, while international students earn even less than their Canadian counterparts (Finnie and Frenette, 2003).

The outcome of these studies highlights several gaps in the literature for developing countries like Trinidad and Tobago. The first of which reveals that there is virtually no research being done on the earnings of different fields of expertise in Trinidad and Tobago, and by extension the Caribbean region. Second, while there is only one similar study done, by Pinitjisamut (2012) who examined the returns to field of study for college-educated workers in Thailand, the literature is quite deficient in the representation of developing countries experiences. Further to this, the empirical literature on education economics have not examined the connection between Trinidad and Tobago's economic instability, and the incompatibility of workers fields of study. The deviation in the returns from these dimensions creates a gap in the literature, of which the findings of this article is likely to fill.

In the case of Trinidad and Tobago, a study of this nature is important because it may assist students, and potential workers to make better decisions when choosing their field of specialty before entering either a specific college major, or training programme after completing

their secondary level of education. In a time of economic uncertainty, this is especially important, as choosing a field which provides a reasonable remuneration may be crucial to maintaining the financial stability of the worker, and that of their household, especially with the introduction of financial assistance initiative such as the GATE programme. Given these policies, a study of this type is quite relevant, as it may help current workers, potential workers, and recent college/secondary school graduates, to identify based on their field of expertise, where employment niches exist, and how to fill these employment gaps. This article is organized as follows; the next section provides a brief overview on the existing literature on the returns to field of study. Following this, the empirical methodology implemented in this study is briefly outlined. After which the results and discussion of the findings of this study is provided, then study is concluded.

Literature Review

The body of literature on education economics, have regularly focused a great amount of attention of the returns to education, while there remains a dearth of information on why workers choose to enter different types of careers, and different types of academic/technical vocational spheres of education (Altonji, Blom and Meghir, 2012). This is particularly true, as there is very little research being undertaken regarding the returns at the college level, across different fields of study. As the need for understanding the role which different fields of studies plays in economic success of a nation becomes stronger, a small research niche emerges in this area concentrated by scholars in the more developed regions of Canada, the US and Europe.

A brief overview of the findings by scholars in the US, finds that there is a widening of the earnings differentials across college majors such as electrical engineering, which later narrowed, leading to an overall wage increase over time. These changes according to Altonji, Khan and Speer (2014) may be due to pre-college ability, preferences for a particular college major, and course content of different college majors, as well as the occupational pursuits of students across different fields of study. Arcidiacono (2004) also finds that there exist large differences in earnings and abilities across majors in the US. This may be attributable to ability sorting across college majors, and preferences for specific college majors by the colleges themselves and the workplace. As American workers holding university level qualifications, i.e., undergraduate degrees, in fields such as education, humanities, economics, management and engineering, notably experienced lower wage returns, and higher levels of wage inequality. While those with an undergraduate degree with a math major, and at least two years of college education, although absorbed quickly into highly quantitative occupations experienced high levels of wage inequality.

Since the choice of major is an important determinant of one's future earnings, it is strongly correlated with the job that one holds, as in the case of the US, humanities majors tend to earn higher returns than those majoring in business (Altonji, Arcidiacono and Maurel, 2015). Thus, students may tend to switch their college major based on their perceived comparative advantage across majors (Arcidiacono, Hotz and Kang, 2012; Cebula and Lopes, 1982). For this reason, students are more likely to choose majors with higher earnings at the beginning of their college programmes (Berger, 1988). The distribution of college major was also cited by Altonji, Arcidiacono and Maurel, (2015) as a factor which influences the skill composition of the US workforce. Where for example, 209 programmes were created to enhance the enrollment students in STEM degrees in 2010, while providing free tuition for high achieving students perusing STEM college majors. Del Rossi and Hersch (2006) finds that in the US, if students pursue a double major in a combination of programmes from the Social Science and STEM field, would lead to 50% higher earnings, than having a single major in either field.

A similar outcome is observed for European workers, as Bartolj and Polanec (2012) finds that the cognitive ability of workers plays a crucial role in the choice of college major, as Slovenian students with higher general ability tend to enroll in Economics majors, and specific ability in

Accounting majors. Further investigation into the labour market attainment of college graduates in the United Kingdom (UK) by Chevalier (2011), discloses that like the US, there is a large difference in the average wages of graduates across a wide range of fields and by their gender (Leary and Sloane 2005). While recent research done by Jacob and Klein (2019, 1850) finds that although the income class of British parents do not influence the occupational prestige of their children, when the field of study is taken into consideration,

"shows that initial differences in occupational prestige and career progression do not differ between graduates from different classes of origin in STEM fields, and arts and humanities. It is only in the social sciences that working-class graduates start with lower occupational prestige but soon catch up with their peers from higher classes."

A look into the college enrollment system in Denmark, according to Daly, Jensen, and Maire (2020, 1) shows,

"that students who are marginally accepted into their preferred program in a broad field that is different from their next-best choice (e.g., business rather than science) experience significant and long-lasting rewards for doing so. In contrast, students whose preferred and next-best program lie within the same broad field do not."

Bearing in mind that the choice of field appears to have a significant impact on the economic returns of persons in that specific field, Kelly, Connell, and Smyth (2010) explains that Irish students tend to benefit from higher returns if they are from mainly STEM fields such as Medicine, Veterinary Science, Engineering & Architecture, Science, and Information Technology (IT).

The choice to enter different fields when explored at the secondary level of schooling, highlights that the family background of Swedish students plays a crucial role in their field of choice (Dhal, Rooth and Stenberg, 2020). In that there is a strong connection to the field chosen based on the gender of siblings, and if the field of study chosen is gender conforming, i.e., conforming to the gender expectations of a specific area of study. Further to this, there were large intergenerational wage spillovers from Swedish parents to their sons, rather than their daughters. This uneven ripple effect may unfortunately lead to greater labour segregation in Sweden.

Similar sentiments are echoed by Helland and Wiborg (2018), who find that the intergenerational reproduction of education fields though extensive, varies across field in Norway. Since Norwegian students tend to enter either the same field as their parent, or an educational field close to those of their parent, if the parent has higher degrees, such as a masters, or doctorate. Even after considering the quality of tertiary institutions, and peer groups, the field of study continues to be a persistent factor when enrolling in Norwegian Colleges (Kirkeboen, Leuen and Mogstad, 2014). As Norwegian students, like their US colleagues tend to choose a field in which they have a comparative advantage.

Empirical Methodology

Schooling improves the earnings capacity of workers because such skills when integrated within the individual cannot be separated. Focusing on the theoretical ideologies of Becker he explains that there are two specifications of specific training. The first refers to any education received, such as training provided internally, which may enhance the productivity of the business offering it to the workers. The second type, known as complete training, "has no effect on the productivity of trainees that would be useful in other firms," (Becker 1975, 26).

The provision of specific training in a particular field of expertise is either borne by either the worker, or their employer. As Becker (1975, 28) explains if the employer covers the cost of training workers then they,

"would collect the returns from such training in the form of larger profits resulting from higher productivity, and training would be provided whenever the return was at least as large as the cost."

However, such provision is not done without risk, as the employer stands to experience a loss should the specifically trained worker decide to end his job contract prematurely. Based on these views, Mincer (1958;1974) designed the Mincerian Earnings Function, to explain wage income as a function of schooling and experience.

To examine the wage returns associated with different fields of study, a sample of workers between the ages of 15-65, who are employed on a full time basis within Trinidad and Tobago's public and private sector business enterprises, in different fields of expertise, was taken from the CSSP dataset for the period 1991-2015, in two cohorts, i.e., 1991-2003 and 2004-2015 to take into account fluctuations in the business cycle. Using this sample data, a modified-version of the mincerian earnings fuction is estimated first by a Ordinary Least Squares (OLS) version of this equation. This is specified as;

$$\ln w_i = \beta_0 + \beta_1 FS_i + \beta_2 X_i + e_i \quad (1)$$

where for the i^{th} worker, $\ln w$ is the natural logarithm of the real hourly wage, FS_i is a set of dummy variables reflecting the workers' specific field of study (Arts, Humanities & Education; Science; Engineering & Architecture; Medicine & Veterinary Science; Social Science; Business; Law; Mathematics & Computer Science; Trade, Craft & Industrial Arts; Transport & Services; and Law enforcement), X_i is the vector of control variables (Primary, Junior Secondary, Secondary, Para-professional levels of study; educational mismatch, i.e., over or undereducation; the parents education, i.e., the mother and fathers years of schooling; gender; potential working experience; marital status; ethnicity; occupation; industry of employment; county; level of skill), and e_i the error term.

This Mincerian equation is also estimated using the Quantile Regression (QR) technique because it allows for the characterization of the entire wage distribution by stating specific cut-off points (Koenker and Bassett 1978, Koenker 2004). For purposes of this study, the wage distribution is separated into five segments to reflect the 10th, 25th, 50th, 75th, and 95th quantiles, because the impact of the workers' field of study is likely to have on their earnings, may vary across the entire wage distribution, depending on their individual level of skill, and the years of schooling spent in a particular field. The use of the QR technique adds to the body of literature by way of its methodological approach as it expands the existing pool of studies using the technique, for which there is currently only two other known studies, i.e., Chevalier (2011) and Kelly, O'Connel and Smyth (2010) based in the UK and Ireland. Based on Koenker and Hallock's (2001) study, the QR equation adapted for this study is specified as;

$$\ln w_i = X_i \beta_\tau + e_{\tau i}, \tau(\ln w_i | X_i) = X_i \beta_\tau \quad (2)$$

where for the i^{th} worker, $\ln w_i$ is the natural logarithm of the real hourly wage rate, X is the vector of control variables as mentioned above, e is the error term, β_τ the unknown vector of parameters (constant), τ the sample quantile, and $\tau(\ln w_i | X_i)$ the conditional quantile (τ) of the workers' hourly wage rate ($\ln w_i$) given the vectors of independent variables (X_i).

For purposes of this study, both equations are estimated under the assumption that the workers' field of study is uncorrelated with the error term. This allows for the presence of endogeneity. It is acknowledged, that this may not be the case, as the workers' field of study may possibly be correlated with both the error term of the above equations, as well as other variables such as the workers' grades for specific subjects, parents' field of study, and distance from the nearest college, which are not captured by the CSSP dataset (Card, 1995; Altonji, Bloom and Meghir, 2012). The estimated returns of the various fields is likely to be biased and have less causal interpretation due to Omitted Variable Bias (OVB). The presence of OVB is quite a common dilemma within similar studies. For this reason, the presence of endogeneity is often not taken into account because it is difficult to find variables to use as instruments for the different fields of expertise, but if found is often difficult to interpret, as the Instrumental Variables (IV) strategy relies on a vector of instruments that does not influence the workers wage, but his field of study.

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Results

The overall earnings of all workers and by their specific field of study was derived by estimating equations (1) and (2) above. A summary of the main results is presented in Tables 1 and 2 below, shows that even though the average earnings, i.e., OLS estimates of workers in most fields have worsen from one cohort to the next, i.e., from 1991-2003, to 2004-2015, those workers who benfitted from an improvement in their earnings were trained in the fields of science, engineering and architecture, and transport and services.

For the 1991-2003 cohort, the earnings of workers in most fields improved across the wage distribution, i.e., reflected by the QR estimates (q10 to q95). The earnings of workers employed in high income jobs in the fields of medicine and veterinary science, social science, law, and mathematics and computer science, however all declined. In comparision, for the 2004-2015 cohort, the returns of workers trained in most fields, i.e., arts, humanities and education, engineering and architecture, medicine and veterinary science, law and transport and services, all exhibit a similar rising trend across the wage distribution, while those in the remaining fields (science, social science, business, mathematics and computer science, and law enforcement) all suffered minimal wage deteriorations at the lower half of the wage distribution, i.e., q10-q25 and q10-q50, before improving to q95.

Table 1. Returns to Field of Study (1991-2003, 2004-2015)

Fields of Study	OLS	q10	q25	q50	q75	q95
Panel A: 1991-2003						
Arts, Humanities & Education	-0.042*** (0.010)	-0.137*** (0.022)	-0.071*** (0.013)	-0.031*** (0.011)	0.001 (0.011)	0.015 (0.021)
Science	0.008 (0.013)	0.006 (0.021)	-0.035* (0.017)	-0.005 (0.015)	0.002 (0.015)	0.033 (0.025)
Engineering & Architecture	0.016 (0.011)	-0.123*** (0.020)	-0.071*** (0.015)	0.021 (0.013)	0.090*** (0.013)	0.140*** (0.025)
Medicine & Veterinary Science	0.055*** (0.012)	-0.007 (0.750)	0.005 (0.017)	0.048*** (0.014)	0.073*** (0.013)	0.049* (0.024)
Social Science	0.060*** (0.016)	-0.018 (0.032)	0.014 (0.019)	0.063*** (0.018)	0.063*** (0.018)	0.061* (0.035)
Business	0.092*** (0.008)	0.033* (0.015)	0.047*** (0.011)	0.088*** (0.010)	0.125*** (0.010)	0.126*** (0.015)
Law	0.228*** (0.032)	0.037 (0.046)	0.175*** (0.024)	0.258*** (0.032)	0.324*** (0.051)	0.290*** (0.055)
Mathematics & Computer Science	0.111*** (0.011)	0.067*** (0.021)	0.072*** (0.015)	0.105*** (0.013)	0.124*** (0.013)	0.110*** (0.020)
Transport & Services	-0.115*** (0.008)	-0.162*** (0.015)	-0.170*** (0.011)	-0.138*** (0.010)	-0.084*** (0.010)	-0.049*** (0.016)
Law Enforcement	0.170*** (0.010)	0.174*** (0.018)	0.187*** (0.013)	0.175*** (0.013)	0.176*** (0.013)	0.147*** (0.018)
Panel B: 2004-2015						
Arts, Humanities & Education	-0.061*** (0.010)	-0.119*** (0.020)	-0.082*** (0.014)	-0.035*** (0.012)	-0.004 (0.012)	-0.021 (0.021)
Science	0.011 (0.013)	0.011 (0.042)	-0.001 (0.020)	-0.001 (0.013)	0.023 (0.014)	0.038* (0.023)
Engineering & Architecture	0.038*** (0.011)	-0.021 (0.019)	-0.013 (0.013)	0.026* (0.012)	0.095*** (0.014)	0.191*** (0.025)

Medicine &	0.014	-0.035*	-0.019	0.009	0.050***	0.099***
Veterinary Science	(0.011)	(0.017)	(0.017)	(0.013)	(0.012)	(0.022)
Social Science	0.027*	0.011	0.009	0.0001	0.036*	0.081***
	(0.015)	(0.034)	(0.020)	(0.017)	(0.020)	(0.029)
Business	0.049***	0.025*	0.018	0.033***	0.078***	0.126***
	(0.008)	(0.015)	(0.011)	(0.010)	(0.010)	(0.018)
Law	0.148***	0.058	0.070***	0.097***	0.204***	0.443***
	(0.028)	(0.366)	(0.020)	(0.023)	(0.033)	(0.121)
Mathematics &	0.018*	0.025	0.009	0.013	0.030***	0.006
Computer Science	(0.009)	(0.016)	(0.011)	(0.011)	(0.010)	(0.018)
Transport & Services	-0.080***	-0.116***	-0.111***	-0.082***	-0.052***	-0.028*
	(0.008)	(0.014)	(0.012)	(0.010)	(0.010)	(0.016)
Law Enforcement	0.136***	0.132***	0.116***	0.136***	0.159***	0.164***
	(0.009)	(0.017)	(0.013)	(0.011)	(0.011)	(0.020)

Note: The coefficient values are statistically significant at all conventional levels of alpha (**0.01, **0.05, and *0.10). Robust standard errors are shown in parenthesis.

Source: Own calculations.

Table 2. Returns of Field of Study by Income Category (1991-2003, 2004-2015)

Income Category	Wage Pattern (Fields of Study)		
	Wage Increase	Wage Decrease	Highest Wage Gains
Panel A: Private & Public Sector Workers			
Low Income	Arts, humanities and education, science engineering and architecture, social science, law, transport and services, and law enforcement.	Medicine and veterinary science, business, and mathematics and computer science.	Engineering and architecture, transport and services, and law enforcement.
Middle Income	Science, engineering and architecture, and transport and services	Arts, humanities and education, medicine and veterinary science, social science, business, law, mathematics and computer science, and law enforcement	Science, engineering and architecture, and transport and services.
High Income	Science, engineering and architecture, medicine and veterinary science, social science, law, transport and services, and law enforcement	Arts, humanities, and education, business and mathematics and computer science.	Engineering and architecture, medicine and veterinary science, and law.
Panel B: Private Sector Workers			
Low & Middle Income	Science, engineering and architecture, law, transport and services, law enforcement.	Arts, humanities and education, medicine and veterinary science, social science, business, and mathematics and computer science	Science, law, law enforcement.

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High Income	Engineering and architecture, law, law enforcement, and transport and services.	Arts, humanities and education, science, medicine and veterinary science, social science, business, and mathematics and computer science.	Engineering and architecture, law, law enforcement.
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Source: Own Compilation based on Table 1.

Discussion

A collective analysis of Tables 1 and 2 above, finds that workers employed in low and high income jobs in the majority of fields benefitted from higher returns in 2004-2015, when compared to wage decline of workers in the fields of business, and mathematics and computer science. These favourable earnings is likely to be linked to changes in the supply and demand for labour at the industry level, such demand, may have been met with the expansion of both higher educational programmes such as GATE, and technical and vocational institutions during the 2009-2015 recessionary period.

The extension of such programmes, may have also changed the composition of the labour force, as the segment of highly skilled workers grew between 1991-2003 to 2004-2015, while semi-skilled and unskilled workers fell. These changes becomes signals as to how public and private sector entities, may be dealing with the impact of the recession. In that private sector businesses may be focusing more on the quality of employees hired because they are more likely to pay a higher wage for a highly/semi-skilled worker based on their ability. This sorting of employees skills and abilities,also influences the returns of workers across fields, because different abilities, either mathematical, analytical, or linguistic may be perceived by employers to contribute differently to both its future earnings, and its productivity (Arcidiacono, 2004). The public sector, may be deviating from this because of higher perceived cost associated with hiring highly skilled workers, and therefore move towards a more cost-effective source of semi and unskilled labour.

The rising returns of the majority of fields in 2004-2015, may also be a reflection of industries ability to absorb workers, there seems to be a greater integration of highly skilled and unskilled persons into the manufacturing; electricity, water and gas; construction, wholesale and retail trade industries. This growth in the demand for highly skilled workers by such industries is likely to be indicative of the presence of SBTC, which occurs when there is a shift in the production technology that favours skilled over unskilled labour by increasing its productivity and therefore, its relative demand. Although, the investigation of the SBTC hypothesis is beyond the scope of this article, its sectoral presence is often found to be strongly linked to wage returns of workers (Haskel and Slaughter, 1998).

The shift in the demand of more highly skilled and semi-skilled workers, implies that local industries maybe more attracted to workers with specialized skills and abilities within occupations. When taken together with the movement towards innovation and automation in the fourth industrial revolution, is likely to be a natural occurrence of SBTC, because industries tend to favour highly skilled, and semi-skilled workers (Ramaswamy, 2018). In the presence of SBTC, the growth in the demand for unskilled workers, may possibly enhance not only their earnings but also the production of goods produced by sources of unskilled labour (Berman, Bound and Machin 1998). While a heightened presence of industrial unrest, trade union representation, membership and industrial unrest lawsuits activity may have influenced the returns of low and high income workers from various fields who are employed within these industries.

The overall wage trend of workers employed in middle income jobs presents quite a different outcome, as the majority of middle-income workers in several fields suffered a wage decline in 2004-2015, in comparison to wage increase in the fields of science, engineering and

architecture, and transport and services. It is possible that middle income workers were most affected by changes in the business cycle because of four reasons. First, during 2009-2015 recessionary period, it is possible that the limited financial resources and budget cuts amongst middle income and private sector business enterprises may have constrained their ability to create job opportunities and sustain them in the long run. As a result, workers earnings eroded in response to their employers' attempts at maintaining its resiliency while mitigating against the financial impact of the recession.

Second, with the expansion of academic and technical/vocational programmes and the subsidization of higher education, it is likely that the supply of workers in the various fields will grow. This will causes these areas of expertise to become saturated, which when met with limited job opportunities, is likely to result in even lower returns, as employers may elect to retain workers who have more working experience and is familiar with the culture of the business establishment, rather than invest in the training of new workers.

Third, the growing presence of information technology (IT) and automation may also influence the returns of middle income and private sector workers, as the integration of IT mechanisms in areas such as asset management, accounting, data analytics, cost control, customer relations, factory automation, and self-service options for routine tasks, is likely to influence the size and structure of businesses. Although, greater use of IT may encourage the growth and production small private sector businesses, for larger private and public sector enterprises it may become a subsitute for workers doing routine tasks (Beede and Montes, 1997). Thus creating greater efficiency, while reducing employment cost.

The automation of middle income jobs, is also likely to limit job creation and the ability of workers to advance within the business, if they are unable to adapt to the use of such technology. The returns of workers in a variety of fields may not improve if they do not have the skills needed to work efficiently in a digitized business environment. It is possible that this may lead to a growth of low income unskilled labour, as this segment of the labour force become unemployable. The continued digitalization of the labour market, may cause the rate of unemployment and uncertainty associated with different fields to rise, as middle income workers become displaced by IT.

Fourth, and bearing in mind the impact that technological change has on job creation and destruction, particularly among middle income workers, this also highlights the presence of job polarization. According to Autor and Dorn (2013), such polarization occurs when the opportunities for job creation occurs more in low and high income jobs, for high-skilled and low skilled workers, while those for middle income jobs for middle/semi-skilled workers contract. The consequence of such polarization, is not likely to be limited to only the reduction of middle income jobs, but also contribute to the stagnancy and decline in wage returns of middle class workers.

Although, an in-depth investigation of job polarization is again beyond the scope of this study, there appears to be much growth in the demand for highly skilled and unskilled workers in variety of industries, especially amongst private sector industries. This is likely to be the result, because private sector employers may invest more in the training and professional development of worker, as employee productivity directly impacts their profit generation. The reduction in the growth of semi-skilled workers employed within industries across fields(arts, humanities, and education, science, medicine and veterinary science, social science, and business), is an indication that jobs in Trinidad and Tobago have becomed increasingly polarized during the 2009-2015 recession.

Conclusion

The linkage between the economic growth of a country, and its human capital asset base, is often a strong one. The main reason for this is because human capital is seen as a driver of economic growth, through the development of its workforce, either through participants working experience, unique skillset, and their cognitive abilities, as reflected through their education and

training. Since human capital is integral to the growth and productivity of an economy, many institutional bodies such as the government, view the process of educating the workforce to be a noteworthy investment which are likely to contribute to the financial stability of an economy in the longrun.

Governments acknowledging this linkage, often seek to improve the skillset of its workers by easing access to higher educational opportunities at the post-secondary and university level. In the case of Trinidad and Tobago, emphasis was placed on the latter through the GATE programme and financial assistance programmes, to boost the enrollment of students in both academic and non-academic fields, as well as technical and vocational areas or subjects. With the progressive influx of more students and mature students, i.e., those persons who are working and attending school part time, while enhancing capacity and pool of the labour market entrants, will also tend to improve the earnings of current and potential workers. As the education and knowledge attained in specific fields of expertise, is expected to enhance the productivity of workers, which in turn creates better employment conditions within public and private sector entities.

Although the long term benefits of investing in the education and training of workers and students alike, has obviously been realized through higher levels of economic growth, student enrollment and graduation, and the creation of a diverse and highly educated workforce, there are still problems which may arise. In the case of Trinidad and Tobago, with the coming of the fourth industrial revolution, together with the effects of the 2009-2015 economic recession, this study have shown that the wage returns or earnings of workers are likely to change across fields or areas of expertise.

In particular, this study finds that the wage returns of workers in most fields have worsened during this recessionary period. A closer look into the estimates derived, reveals that those specifically employed in low-, and high-income jobs in science, engineering, and architecture, benefitted from better returns in 2004-2015, when compared to those in the social sciences, while those in middle income jobs mostly declined. These findings maybe linked to more worrying economic issues such as the presence of SBTC, the Polarization of Jobs of Middle Income Jobs, the displacement of middle income workers, and the further intensification of educational mismatch in Trinidad and Tobago. The findings of this study, therefore highlights the need for continuous learning and development of workers, through the building of skills in a vast array of areas such as entrepreneurship, STEM competencies, and the need for high impact investments to be made by public and private sector entities.

References

1. Altonji, J. 1993. The Demand for and Returns to Education When Education outcomes are Uncertain. *Journal of Labor Economics*, 11(1), 48-83. Retrieved from <http://www.jstor.org/stable/2535184>.
2. Altonji, J., Arcidiacono, P., & Maurel, A. 2015. *The Analysis of Field of Choice in College and Graduate School: Determinants and Wage Effects*. Cambridge, Massachusetts: National Bureau of Economic Research (NBER).
3. Altonji, J., Bloom, E., & Meghir, C. 2012. *Heterogeneity in Human Capital Investments: High School Curriculum, College Major and Careers*. Cambridge, Massachusetts: National Bureau of Economic Research (NBER).
4. Altonji, J., Khan, L., & Speer, J. 2014. Trends in Earnings Differentials across College Majors and the Changing Task Composition of Jobs. *American Economic Review*, 104(5): 387-393.
5. Arcidiacono, P. 2004. Ability Sorting and the Returns to College Major. *Journal of Econometrics*, 121, 343-375. doi:10.1016/j.jeconom.2003.10.010.

6. Arcidiacono, P., Hotz, J., & Kang, S. 2012. *Modeling College Major Choices using Elicited Measures of Expectations and Counterfactuals*. Working Paper, 15729. Cambridge, Massachusetts: National Bureau of Economic Research (NBER). DOI 10.3386/w15729
7. Autor, D., & Dorn, D. 2013. The Growth of Low-skill Service jobs and the Polarization of the US Labor Market. *American Economic Review*, 103(5), 1553-1597. Retrieved from <http://www.jstor.org/stable/42920623>.
8. Bartolji, T., & Polanec, S. 2012. College major choice and ability: Why is General Ability not enough? *Economics of Education Review*, 31, 996-1016. doi.org/10.1016/j.econedurev.2012.07.010.
9. Becker, G. 1975. *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. Cambridge, Massachusetts: National Bureau of Economic Research (NBER).
10. Beede, D., & Montes, S. 1997. *Information Technology's Impact on Firm Structure: A Cross-Industry Analysis*. Maryland, United States: Economics and Statistics Administration.
11. Berger, M. 1988. Predicted Future earnings and Choice of College Major. *Industrial and Labor Relations Review*, 41(3), 418-429. Retrieved from <http://www.jstor.org/stable/2523907>.
12. Berman, E., Bound, J. & Machin, S. 1998. Implications of Skill-Biased Technological Change: International Evidence. *The Quarterly Journal of Economics*, 113(4), 1245-1270. Retrieved from <http://www.jstor.org/stable/2586980>.
13. Card, D. 1995. *Using Geographic Variation in College Proximity to Estimate the Return to Schooling, in Aspects of Labour Market Behaviour*:Toronto: University of Toronto Press.
14. Cebula, R. J., & Lopes, J. 1982. Determinants of student choice of undergraduate major field. *American Educational Research Journal*, 19(2), 303–312. DOI: 10.2307/1162572
15. Chevalier, A. 2011. Subject choice and Earnings of UK graduates. *Economics of Education Review*, 30, 1187-1201. doi:10.1016/j.econedurev.2011.04.007.
16. Dahl, G., Rooth, D., & Stenberry, A. 2020a. *Long-Run Returns to Field of Study in Secondary School*. Cambridge, Massachusetts: National Bureau of Economic Research (NBER). DOI 10.3386/w27524
17. Dahl, G., Rooth, D., & Stenberry, A. 2020b. *Family Spill overs in Field of Study*. Cambridge, Massachusetts: National Bureau of Economic Research (NBER). DOI 10.3386/w27524
18. Daly, M., Jensen, M., & Maire, D. 2020. *University admission and preferred field of study*.
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiKnYHZwOzwAhUvTTABHTSIA6MQFjABegQIBBAD&url=http%3A%2F%2Fwww.lemaire.dk%2FDaly_Jensen_leMaire2020Nov.pdf&usg=AOvVaw1Lazh3rZdNrcDeY707wh-W
19. Del Rossi, A., & Hersch, J. 2008. Double your Major, Double your Return? *Economics of Education Review*, 27: 375-386. DOI: 10.1016/j.econedurev.2007.03.001.
20. EU (European Union). 2021. *National Policies Platform*. <https://national-policies.eacea.ec.europa.eu/>
21. Finger, C., Solga, H., Ehlert, M., & Rusconi, A. 2020. Gender differences in the choice of field of study and the relevance of income information. Insights from a field experiment. *Research in Social Stratification and Mobility*, 65. DOI: 10.1016/j.rssm.2019.100457
22. Finnie, R., & Frenette. M. 2003. Earning differences by Major Field of Study: Evidence from three cohorts of recent Canadian graduates. *Economics of Education Review*, 22: 179-192. DOI: 10.1016/S0272-7757(02)00003-1.

23. Haskel, J., & Slaughter, M. 1998. *Does the Sector Bias of Skill-Biased Technical Change Explain Changing Wage Inequality?* Cambridge, Massachusetts: National Bureau of Economic Research (NBER).
24. Helland, H., & Wiborg, O. 2018. How do parents' educational fields affect the choice of educational field? *The British Journal of Sociology*.
25. Jacob, M., & Klein, M. 2019. Social origin, field of study and graduates' career progression: does social inequality vary across fields? *The British Journal of Sociology*, 70(5): 1850-1873. DOI: 10.1111/1468-4446.12696
26. Kelly, E., O'Connell, P., & Smyth, E. 2010. The Economic Returns to Field of Study and Competencies among Higher education Graduates in Ireland. *Economics of Education Review*, 29, 650-657. doi:10.1016/j.econedurev.2009.11.001.
27. Kirkeboen, L., Leuven, E., & Mogstad, M. 2014. *Fields of Study, Earnings, and Self-Selection*. Working Paper, 20816. Cambridge, Massachusetts: National Bureau of Economic Research (NBER).
28. Koenker, R., & Bassett, G. 1978. Regression Quantiles. *Econometrica* 46 (1): 33. DOI:10.2307/1913643.
29. Koenker, R., & Hallock, K. 2001. Quantile Regression. *The Journal of Economic Perspectives*, 15 (4): 143-156. DOI: 10.1257/jep.15.4.143.
30. Koenker, R. 2004. Quantile regression for Longitudinal data. *Journal of Multivariate Analysis*, 91 (1): 74-89. DOI: 10.1016/j.jmva.2004.05.006.
31. Leary, N., & Sloane, P. 2005. The Return to Education in Great Britain. *National Institute of Economic Review*, DOI: 193(1). 10.1177/0027950105058559
32. Mincer, J. 1958. "Investment in Human Capital and Personal Income Distribution." *Journal of Political Economy* 66(4):281-302. Accessed October 18, 2018. <https://www.jstor.org/stable/1827422>.
33. Pinitjitsamut, M. 2012. An estimation of Lifetime earnings and Return on Undergraduate education investment for different fields: A case of Thailand. *International Journal of Education Economics and Development*, 3,149-163. doi: 10.1504/IJEED.2012.047101.
34. Ramaswamy, K. 2018. *Technological Change, Automation and Employment: A Short Review of Theory and Evidence*. Mumbai, India: Indira Gandhi Institute of Development Research.