HUMAN CAPITAL CONTRACTS AS INVESTMENT PORTFOLIO

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Abstract: *Given the importance of education for a country's development, most governments have subsidized higher education. This solution, however, is not sustainable in the light of the fiscal constrains faced by governments and the rising demand for tertiary education. This article makes an economic case for Human Capital Contracts (HCCs), an equity-like approach to financing education, first proposed by Milton Friedman. To achieve this we approach the problem using human capital theory, particularly from Gary Becker's and Jacob Mincer's work. The resulting equations permit an analysis of the role the different variables play in the valuation of HCCs. In the end we use date from The Financial Times' "European Business School Ranking 2014" to illustrate how parameters in HCCs can be designed such that they become financially successful.*

Key words*: human capital, financing risky investment, investment, portfolio, education*
JEL-codes: *G11, I22, J24*

INTRODUCTION

Education is one of the cornerstones of a country's development. To ensure the availability of higher education, as well as on the grounds of merit and external effects of higher education, governments have subsidized tertiary education in most countries. Doing so governments aimed to minimize the possibility of capital markets failure in delivering a sufficient supply of funds to graduates to finance their education and to guarantee equal opportunity to all students, indifferent of socio-economic background. Education subsidies avoid financial market failures by reducing the need for students to borrow and reducing risks of debt financed education. However, the model has at least two problems: first, it can become ineffective; and, secondly, governments do not have the resources to expand the system in an appropriate manner. Thus, broadening the supply of higher education, while providing a high quality institutions using public funds is highly unlikely, if not impossible. Hence, alternatives for increase the supply of higher education without increasing the use of public funds should be explored.

Human Capital Contracts (HCCs) are one available alternative to solving this crisis. HCCs are contracts in which students commit part of their future income for a predetermined period of time in exchange for capital to finance their education.

MATERIALS AND METHODS

The main drivers of value in a HCC are: (1) income during the repayment period, (2) percentage of income collected, (3) administration costs, (4) fraction lost due to fraud, and (5) unemployment rate.

$$HCCV = p * Y_s * e^{-i*s} * f\big(i, K, G(t)\big) * (1 - (a + d + u))$$

Where: HCCV – Human Capital Contract value ; p – percent of income demanded; Y_s – income after graduation; i – discount rate; k – payment period; a – administrative costs; d – fraud; u – unemployment;

$f\big(i, K, G(t)\big) = \int_0^K e^{-gt^2} e^{i-t} * dt$; g – growth rate;

To determine the percentage of income that investors will require from students in exchange of capital, the cost of attending the university has to be combined with the value of the contract.Investors will engage in the contract only if its value is more than the amount they are giving tothe student to cover education and living expenses. The profit an investor obtains is:

$P = HCCV - C$; where: P – profit; C – present value of investorcovered costs

As profits can wary, investors need to at least be aware of the minimum percentage of income that they need to demand in order to breakeven. If profits are zero, then:

$HCCV = C$

We can now substitute this in the HCCV formula to obtain the equation for p:

$$p = \frac{C * e^{i*s}}{Y_s * f(i, K, G(t)) * (1 - (a + d + u))}$$

As expected income growth and repayment period will have an impact on whatpercentage of income students will have to commit. The precise impact, however, depends onthe shape of the income growth. Administration costs, default rates, and unemployment all add up tomake the instrument more expensive for the student. Finally profit can be incorporated:

$P = p * (1 + r)^k$; where r – annual profit margin

Eventually, any of these factors can make the instrument prohibitively expensive for students iftheir levels get to be too high.

RESEARCH RESULTS

The following parameters were used to estimate HCCV, based on a portfolio of universities selected from the Financial Times'list "European Business School Ranking 2014",which includes the top MBA and Master in Management (MIM) programs. Expected income after graduation was also taken from the Financial Times' list, and it shows the average income three years after graduation. Since not all universities presented revenues, only 70 who had income for at least one of the two programs were kept. The cost of unemployment and fraud were estimated based on macroeconomic data from 19 countries (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden, UK, Australia, US, Canada, Japan, Norway, Korea). The list of countries was determined by primary research (contacting each university) as the main destination for graduates from selected universities and datawas sourced form OECD. The discount rate was determined by primary research, contacting LEK, a management consulting company. Finally we added three potential revenue growth scenarios with nominal growth rates of 7%, 10% and 15%. They were determined through primary research with university graduates, by contacting HR or employees at many companies targetedby the graduates from the selected universities and through data found in Bloomberg's "Best Business Schools 2015" study.

The next step was to calculate the study cost (C). During this process forgoneincome during the study was not take into account because it only affects the student and not a potential investor. Information about tuition fees and cost of living were obtained from the university websites. The final cost being determined through the following formula:

$C = C_L * t + C_T$; where: C_L– monthly living costs; t – study duration; C_T – tuition fee

This value is considered the maximum amount the investor can be expect to pay.

After replacing HCCV with C we can calculate the required percentage which should be asked from graduates of each university so that the investor can breakeven. Since the goal is creating a portfolio we will need to determine the per year average present value of income for each program, from which point the portfolio break even p can be determined (thistakes as a hypothesis a 1:1 investment between each of the portfolio universities). Once thishas been estimated we obtain the following results:

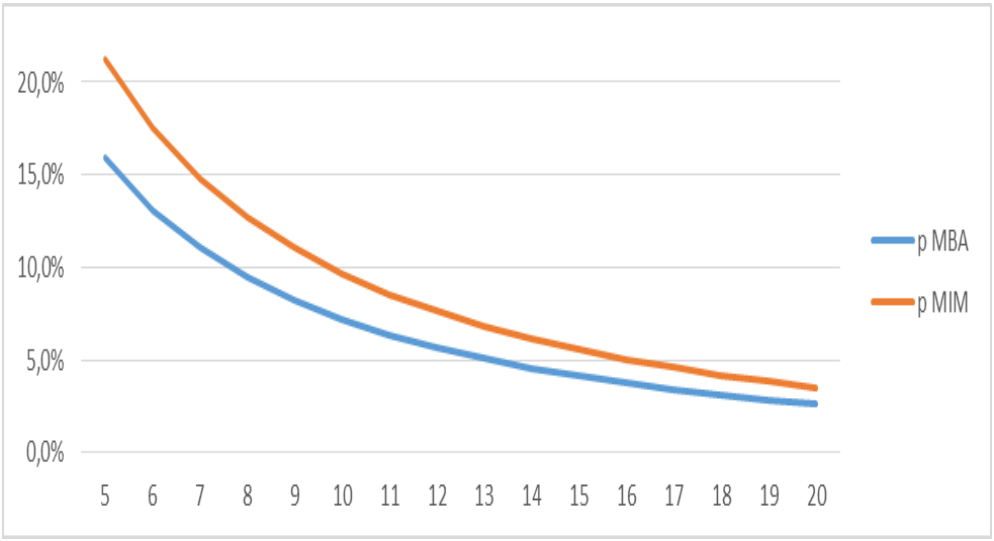

Figure 1 p variation based on repayment period
Source: data The Financial Times

From this point we select universities that have an ROI of 800% 3 years after graduation. This leaves a set of four universities for the MBA program and a set of five universities for MIM.

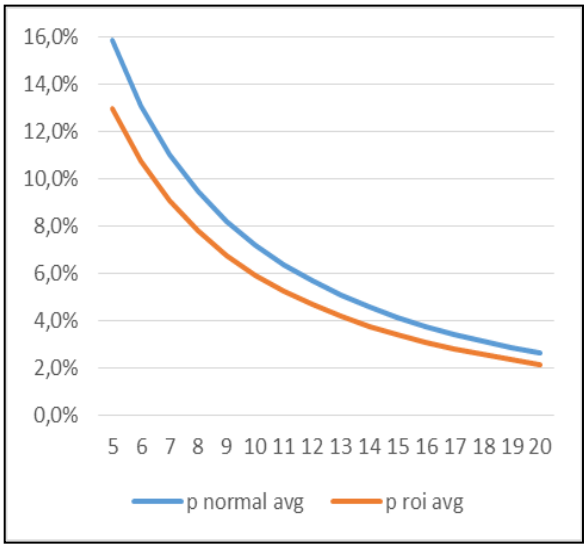

Figure 2 p variation based on repayment period for MBA
Source: data The Financial Times

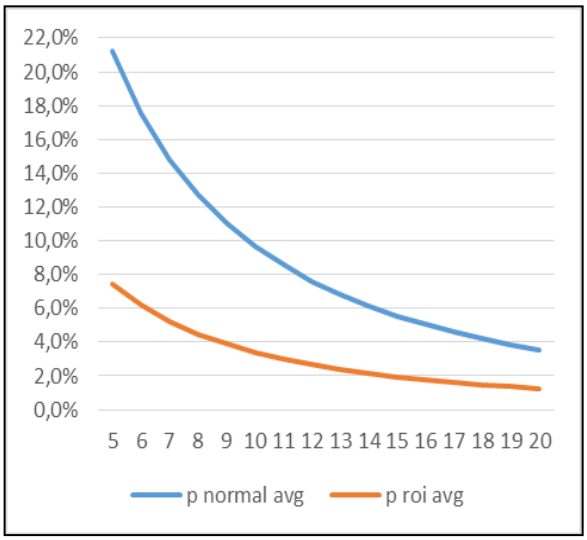

Figure 3 p variation based on repayment period for MIM
Source: data The Financial Times

Now we have an investment guide that tells us how much to ask in order to breakeven when covering the entire study cost. However, we can expect a large number of potential customers will want a loan for a portion of the costs. Therefore, we must be able to determine how much p should grow for each $1,000 increment.

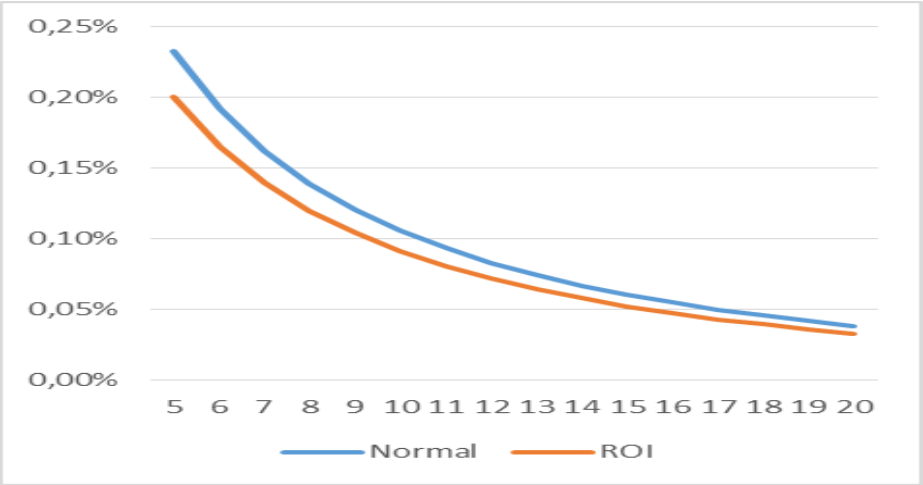

Figure 4 p/$1000 variation based on repayment period for MBA

Source: data The Financial Times

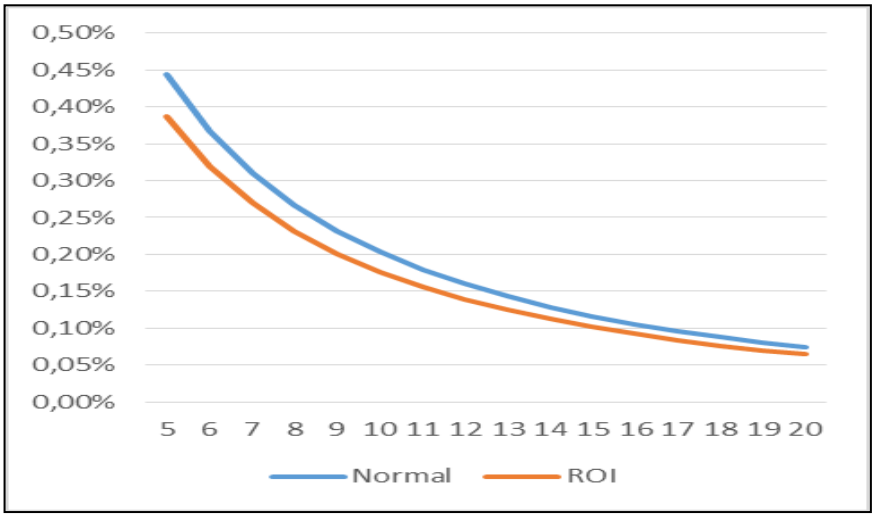

Figure 5 p/$1000 variation based on repayment period for MBA

Source: data The Financial Times

Final difference we need to adjust the model for gender, as based onmacroeconomic data, women have a higher unemployment rate and lower salaries compared to man. Adjusting for these we can estimate the percentage difference per $1000 increment,between man and women for the selected portfolios of both courses.As expected, given the macroeconomic differences between man and woman, there is a seeable effect on p. However, as the repayment period lengthens the difference shrinks. Starting withyear11, the divergence becomes insignificant for both MIM and MBA. In addition to this before this point the differences are too small to generate significant impacts. Going forward we will not offer gender-based discriminatory pricing.

After adding the yield, we can see below, that up to a 8% per annum, for both MBA and MIM p is tilted downward for each additional repayment year. Starting with an annual yield of 9%, after a certain number of years p begins to increase as the compounding effect of the real income growth rate is slower than that of the yields.

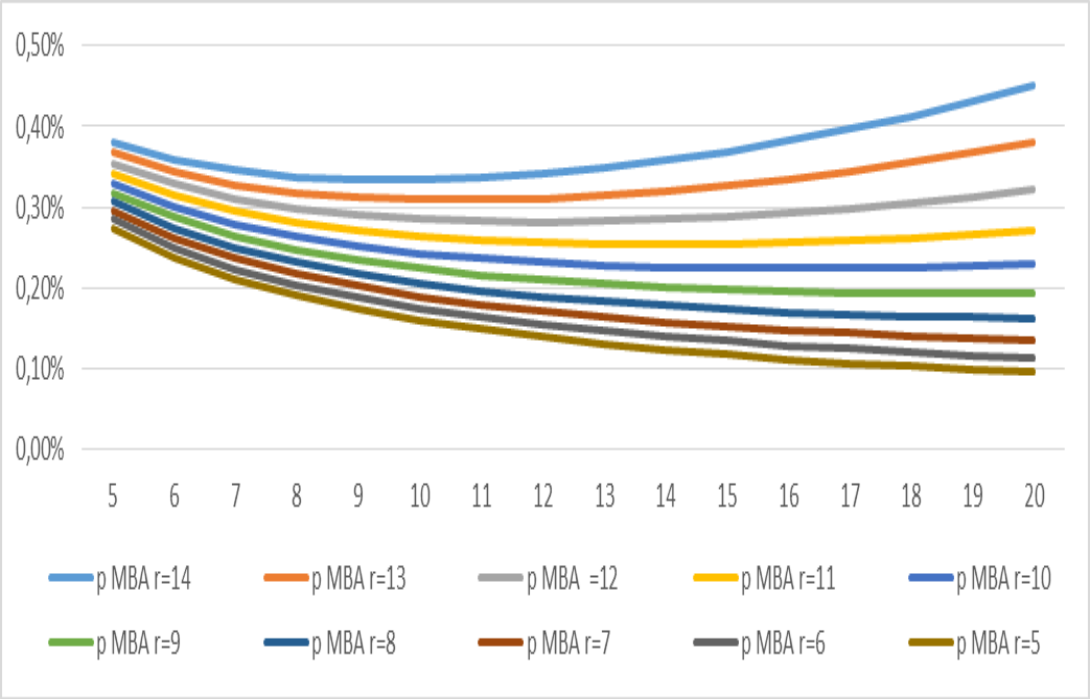

Figure 6 p/$1000 variation based on repayment period and yield for MBA
Source: data The Financial Times

CONCLUSIONS

At first, when comparing the full portfolio (not selected by ROI), one would have advised investors to look at future MBA graduates as the best possible investment. Once we accounted for ROI and selected the most profitable programs MIM became the best option, as long as the investor is expected to cover the full study cost. If one borrows in $1000 increments then even in the ROI portfolio it is still more profitable to invest in MBA graduates as long as the amount demanded in by future MBA graduates is not double that demanded by future MIM graduates.

The values obtained above show that a scheme that uses HCCs can be implemented, even ifnot covering 100% of the costs of studying. The same methodology can be used so seekfeasibility for other courses and universities.

Some caveats need to be added. First, we can still refine to a much more precise level toinclude other relevant variables and, second, we need to compare HCCs to other investments ofsimilar risk to see how it competes with those.

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