THE HUMANITY OF HUMAN CAPITAL CONTRACTS

An assessment of Human Capital Contracts on the UK economy

Abstract

Human Capital Contracts are an alternative to personal debt financing. This paper explores the impact of introducing human capital contracts into the UK market.

StepEx

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Introduction

Human Capital Contracts (HCC) are an alternative to personal unsecured debt. A HCC provides a framework for an individual to sell the rights to a proportion of their future income in return for an upfront capital payment. A HCC is best suited to finance an activity that will increase the future earning potential, or human capital, of an individual. This activity must be one that has a real impact on the ability of an individual to make repayments by increasing their income and thus improving their risk / return profile. However, the capital borrowed is unreclaimable once used, so in the event of a default it is unlikely the Capital Provider will be able to reclaim any substantial portion of their capital.

Unsecured personal debt is not suited to this instrument because downside risk is shared but the upside potential accrues only to the Capital User. Capital Users repay a fixed amount regardless of their ability to repay under debt leading to higher default rates than under the HCC framework that matches repayments broadly to the ability to repay (income).

This paper is an evaluation of the impact of Human Capital Contracts as an alternative to personal debt financing using the United Kingdom university graduate population as a test case. We evaluate key measurable impacts, predominantly financial, and do not look at the more intangible benefits such as health and general wellbeing although evidence of these has been found in prior studies (The Roosevelt Institute Centre on International Development, 2015).

Human capital contracts have been proposed as a means of financing education many times over the last 70 years most notably by the famous economist Milton Friedman (Friedman, 1955) and more recently by popular magazines such as Vice (Vice Magazine, 2014) and Forbes (Leef, 2014). However, a commercially scalable and financially sustainable enterprise for this type of finance has not yet been launched.

The core motivation of this study is to estimate the impact of introducing HCC into the UK market, and the barriers to commercialisation. Where possible assumptions have been based on historical datasets and prior studies. Where no reliable data source or prior study was available a rational assumption has been made and explained. It is hoped that future studies will evaluate and refine these assumptions and evolve these estimates.

Executive Summary

Human Capital Contracts (HCC) provide substantial benefits for Capital Users, Capital Providers and the economy overall. However, there are significant barriers to setting up a commercial scale enterprise.

Capital Users gain two key benefits from HCC leading to a £91,000 lifetime benefit in real terms that accrues in greater measure to the poorest in society.

1. Repayments are correlated with income, so they are more affordable for Capital Users than an equivalent debt instrument. Correspondingly default rates will fall by 53%, lowering the cost of capital provision. This reduces the overall economic cost of a university degree by an average £134,000 per individual and £356,000 for the poorest segment of society.
2. Participation by Capital Providers in the Capital Users future income introduces an incentive to provide access to networks and advice that are not available to less wealthy and less socially connected Capital Users. This increases lifetime earnings by £40,000 per person. The largest proportion of these benefits accrue to Capital Users in lower wealth segments.

Capital Providers gain three key benefits from HCC leading to 25-54% higher returns to capital than a comparable debt-based portfolio.

1. The expected capital lost due to default is 53% lower than a comparable debt portfolio. This is because repayments linked to income are more affordable and thus more often paid, largely mitigating the most common source of default. Furthermore, if income drops below a threshold, payments are deferred rather than defaulted on. This is advantageous as a default has low reclamation rates on unsecured graduate finance and graduate earnings rise at a higher rate than the cost of capital.
2. Upside is not capped as it is with debt financing (the cap being the agreed repayment schedule). HCCs participation in upside increases overall portfolio yields by 34% for above average earning investments. A further 14% can be gained by providing the Capital User with access to networks and advice that increase income and thus increase capital yield.
3. Pricing HCC on an individual basis against income earning potential leads to capital yield increases of up to 14% per annum rather than relying on broad brush measures such as credit scores that are inappropriate for people who have not extensively used the financial system.

The UK economy would benefit by an average of £91,000 in real terms per individual who requires this type of finance, from the availability of HCC. This equates to an additional £36 billion annually for the UK economy. This figure does not include the benefit for Capital Providers or a more productive workforce, both of which are likely to be significant. The figure also assumes that there are no government subsidised student loans. These loans reduce the total benefit by approximately 60% to £14 billion annually.

For Capital Users these benefits disproportionately accrue to poorer segments of the population providing social mobility for talented but less wealthy individuals. The reduction in the poverty premium for the total cost of a degree, leads to an incentive for all segments of the population to upskill. Under the current debt-based system the poorest quartile of the population has no financial incentive to complete a university degree.

Substantial barriers to introducing this framework exist. Most notably a legal and regulatory framework designed for debt. There is also likely to be a substantially higher operational cost than traditional debt due to the requirement to verify earning potential data and validate income.

Methodology

Capital Users

Population

The population was divided into 21 equal segments based on the wealth they had access to forming the basis of the wealth dependent cost and revenue function.

Net Personal Benefit

The Average Net Personal Benefit of HCCs was calculated by assessing the additional income gained from having a degree compared to the total economic cost of attaining that degree for HCC and subtracting the same scenario under an equivalent debt instrument.

$$[\sum_{i=1}^{21}\{\sum_{y=21}^{64}(Giy - Aiy) * (m(1-i) * (1-r^y)\} - (d+e+Ei) * KHi + o + Oi$$

$$- \sum_{i=1}^{21}\{\sum_{y=21}^{64}(Giy - Aiy) * (1-r^y)\} - (d+e+Ei) * Ki + o + Oi]$$

$$\div 21$$

Where:
i denotes wealth segment from 1st to 21st percentile
G denotes Graduate lifetime earnings
A denotes A-level lifetime earnings
m denotes the maximum benefit from mentoring
r denotes discount rate applied to future earnings
y denotes year of future earnings from 21 to 64 with 1 = age 21
d denotes the course fees for the degree
e denotes the minimum living expenses
E denotes the discretionary living expenses
K denotes the cost of capital
KH denotes the cost of capital with the availability of HCC
o denotes the minimum opportunity cost of full time study
O denotes the variable opportunity cost of full time study

Capital Providers

Population

The population was segmented along two dimensions, the first into 11 equal income earning segments and the second into 11 equal basic required expenditure (the income that will be spent on essentials before any repayments to investors will be made) segments. This results in a total of 121 unique segments with a different combination of income and required expenditure. We assumed no mobility between segments.

Downside Reduction

The reduction in the downside was the inverse of the average expected vs average actual repayments under HCCs minus that of an equivalent debt instrument.

$$1 - (\{[\sum_{i=1}^{20}(rh * Ya) - (ARa)\,] - [\sum_{i=1}^{20} d - AD\,]\} \div ai)$$

Where:
AR denotes actual HCC repayments given by $\sum_{a=1}^{121}(\mathrm{Ya} * \mathrm{rh} - \mathrm{Ea})$ where limit AR ≤ R & 0 ≤ Ea
AD denotes debt repayments given by $\sum_{a=1}^{121}(\mathrm{d} - \mathrm{Ea})$ where limit AD ≤ R ≤ d & 0 ≤ Ea
R denotes repayment
i denotes year since graduation from 1 - 20
a denotes unique segment year from 1 - 121
Y denotes income
rh denotes the proportion of income to be repaid using a HCC
E denotes required expenditure

Upside Potential

The additional return from participation in upside was calculated as the actual return in the case of HCC minus the return from a comparable debt product.

$$\{[\sum_{i=1}^{20}(ARa)\,] / [\sum_{i=1}^{20} AD]\} - 1$$

Where:
AR denotes actual HCC repayments given by $\sum_{a=1}^{121}(\mathrm{Ya} * \mathrm{rh} - \mathrm{Ea})$
AD denotes debt Repayments given by $\sum_{a=1}^{121}(\mathrm{d} - \mathrm{Ea})$ where limit 0 ≤ R ≤ d & 0 ≤ Ea
R denotes repayment
i denotes year since graduation from 1 - 20
a denotes unique segment from 1 – 61 where income earning percentage ≥ 50th
Y denotes income
rh denotes the proportion of income to be repaid using a HCC
E denotes required expenditure

Selectivity

The maximum additional return from selectivity was calculated by assuming Capital Providers could determine who was in the top earning percentile while Capital Users assumed they would be average.

$$\sum_{i=1}^{20} AR100i \;/\; \sum_{i=1}^{20} AR50i - 1$$

Where:
AR denotes actual HCC repayments given by $\sum_{a=1}^{121}(\mathrm{Ya} * \mathrm{rh} - \mathrm{Ea})$ where limit 0 ≤ R & 0 ≤ Ea
100 denotes the actual return being that of the 99.6th percentile

50 denotes the actual return being that of the 50th percentile
i denotes year since graduation from 1 - 20
Y denotes income
rh denotes the proportion of income to be repaid using a HCC
E denotes required expenditure
a denotes expenditure for each segment

Data and Assumptions

a) Utility of money
b) Rationality with perfect information
c) Wealth segments
d) Graduate and non-graduate earnings
e) Graduate income across wealth segments
f) Impact on mentoring
g) Cost of a degree
h) Living expenses
i) Opportunity cost of study
j) Cost of capital
k) Population
l) Investment instruments
m) Repayments
n) Impacted population segments

Standard assumptions

a) We have assumed that the utility of money is equal across income segments

Assumption a) is a standard economic assumption however the effect on our data model may be significant. As this study disproportionately impacts poorer segments the gains made are likely to be economically more valuable as they will accrue to those who derive a higher utility from each additional unit of money earned (the poor). However, poorer segments are likely to value marginal changes at lower absolute earnings levels than changes that accrue at higher levels. Meaning they are likely to be less willing to trade-off lost earnings in the short term (opportunity cost of time studying) for higher future earnings than their wealthy counterparts.

b) We have assumed that people are motivated primarily by financial gain and make choices in a rational manner with perfect information

Capital User Model

c) Population Segmentation

For each segment the average has been treated as being spread equally across the segment population. We have assumed these segments are fixed.

Earnings

d) & e) Lifetime Earnings

Graduate lifetime earnings have been compared to those who completed A-levels only (Appendix: Figure 10). It may be possible there is a bias in this assumption as the pool of graduates may have had higher income earning potential even without a degree.
We have assumed an equal rate of graduates to the current market rate (42% (Office for National Statistics (UK), 2017)) would be reflected equally across segments. Future income streams were discounted by 2% to bring future flows in line with our preference for income in the present. Inflationary effects were factored into the original dataset based on 2016/17 figures.

Graduate lifetime earnings for the wealthy are 16-20% higher than for poorer graduates (Britton, 2017). We segmented income with the wealthier half of segments earning on average 18% more than the poorer half, apportioned linearly across segments.

f) Mentoring

We have assumed the impact of mentoring to be between 0 and 30% increasing linearly as wealth segments decrease, resulting in an average increase of 14%. This assumes that wealthy segments already have access to networks and advice from successful mentors. For lower income segments, access will be provided by Capital Providers (as the holders of capital predominantly from wealthier segments) whose interests are now aligned to the lower wealth segment Capital User. The average impact was informed by a study (Duvall, 2016) which found the average impact of mentoring on income was a 22% increase for junior employees and 34% for management level employees. Given the likelihood that some participants would not use this incentive and the access required may not match the access supplied we have discounted this to a lower rate of 14% average increase in income.

Costs

g) Degree

The cost of a degree was £9,250 per year with a duration of 3 years (The Times, 2017) totalling £27,750 in total. This was assumed as constant for all applicants regardless of wealth.

h) Living Expenses

The average cost of accommodation for university students over three years was £14,625 (The Times, 2017), we estimated that, including accommodation but excluding course fees the base expenses required to complete a degree over three years was £24,000. It was assumed that poorer students would spend less than wealthy students based on their higher propensity to spend. As such discretionary spend of £18,000 to £0 over three years being linearly tapered across the wealth segments with the wealthiest accruing the full discretionary spend and the poorest accruing none of it, making the total living expense estimate range from £24,000 to £42,000 across wealth segments over the three years.

i) Opportunity Cost of Study

During the study period the candidates could have earned £15,850 per annum (age 21 – 24 average non-graduate income) (Office for National Statistics (UK), 2017). It was estimated that part time work would command half that figure. Given that wealthier students were likely to have higher earnings than average and be less likely to work during their studies we have added a discretionary opportunity cost of earnings of £30,000 over the course of study that is applied linearly according to wealth segment with the wealthiest accruing the full discretionary addition and the poorest accruing none of it.

j) Cost of Capital

It has been assumed that government subsidised student loans (as of 2018 at 6.1% interest and covering 50-60% of students) do not exist.

For the wealthiest quartile of individuals 1.5% is the assumed rate of capital as an estimate of the immediate family's (parents') worst performing returns for liquid capital in their portfolio.

For the second richest quartile of Capital Users the cost of capital has been assumed at 2.5% which is slightly above the average rate to re-mortgage a property in the UK in July 2018.

For the third richest quartile of Capital Users the average APR of 14.7% provided by Future Finance (Future Finance, 2018) has been used.

For the poorest quartile the maximum APR of 24.9% provided by Future Finance (Future Finance, 2018) has been used.

Capital Provider Model

k) Population

All population segments (wealth, income and unique combined) have been assumed as fixed.

l) Investment Instruments

The HCC terms used were 5% gross income for 20 years in return for £15,000.

The comparable debt instrument compared was a £15,000 unsecured personal loan at 8% interest rate commencing one year after the loan is made with 20 years of fixed repayments. This was chosen because it represents slightly above average (between the 50th and 60th percentile equivalent ROI for a £15,000 debit in return for 5% of the average graduate's income for 20 years.

Earnings figures and earning increases were based on those for a final year undergraduate aged 20 who will graduate and start earning income before their 21st birthday.

m) Repayments

Expenses across the 11 segments were based on a normalised distribution with a mean of £13,400 which was the gross income required to cover the basic expenditure for a single person in Britain (The Guardian, 2008). This distribution had a standard deviation of £7,000. This was chosen so that the distribution included the basic expenditure of £26,800 required by a sole supporting parent to support a family of a spouse and two children at the highest end of the expense distribution. The distribution was limited at the lower bound such that expenditure was never less than £7,488, the gross income required to sustain a life of absolute poverty (BBC, 2017).

The repayment rate under debt assumes any individuals who repays zero in a year will default and expected returns that default are subject to a capital recovery rate of 10% of capital provided.

The absolute default rate assumes that after ten years any HCC which hasn't had any repayments is in default and 0% is recovered.

n) Impacted population per year

The age group used as eligible for education financing now and in the near future in the UK were those aged between 15 and 19 with a total population of 3,778,900 (Statista, 2018). One quarter of this was the annual cohort estimate of 944,725 people. This gives an estimate of 44,987 people per 21 wealth segments. We have taken the national average of 42% of people (Office for National Statistics (UK), 2017) per segment having a graduate degree giving an estimate of 18,895 people per segment.

Data Sources

Earnings data was sourced from (Office for National Statistics (UK), 2017) and is available publicly via the ONS website.

Results

Economy

The benefit to the economy of the introduction of HCCs for further education financing was £36 billion annually. This was made up of the £91,000 per individual additional lifetime benefit from HCCs (Figure 1) multiplied by the impacted population per year of 18,895. This does not include the benefit to Capital Users of a higher risk weighted return to capital.

Figure 1: Net Individual Benefit under Debt and Human Capital Contracts (£000's)

	Without HCC			*With HCC*			Comparison
Wealth Segment	Lifetime Earnings Uplift	Economic Cost of a Degree	Net Benefit	Lifetime Earnings Uplift	Economic Cost of a Degree	Net Benefit	Additional Net Benefit from HCC
100%	365.9	134.7	231.2	365.9	134.7	231.2	0.0
95%	358.6	132.2	226.4	364.0	132.2	231.8	5.4
90%	351.3	129.6	221.7	361.8	129.6	232.2	10.5
85%	344.0	127.1	216.9	359.5	127.1	232.4	15.5
80%	336.7	124.5	212.1	356.9	124.5	232.3	20.2
75%	329.3	129.8	199.5	354.0	129.8	224.2	24.7
70%	322.0	127.1	194.9	351.0	127.1	223.9	29.0
65%	314.7	124.5	190.2	347.7	124.5	223.2	33.0
60%	307.4	121.8	185.5	344.3	121.8	222.4	36.9
55%	300.1	119.2	180.9	340.6	119.2	221.4	40.5
50%	292.7	278.2	14.5	336.7	158.3	178.4	163.8
45%	285.4	273.2	12.3	332.5	155.0	177.5	165.2
40%	278.1	268.1	10.0	328.2	151.7	176.4	166.4
35%	270.8	263.1	7.7	323.6	148.5	175.1	167.4
30%	263.5	258.0	5.5	318.8	145.2	173.6	168.1
25%	256.2	551.0	0.0	313.8	164.4	149.3	149.3
20%	248.8	541.2	0.0	308.6	160.8	147.7	147.7
15%	241.5	531.3	0.0	303.1	157.2	145.9	145.9
10%	234.2	521.5	0.0	297.4	153.5	143.9	143.9
5%	226.9	511.7	0.0	291.5	149.9	141.6	141.6
0%	219.6	501.9	0.0	285.4	146.3	139.1	139.1
Average	**292.7**	**274.8**	**100.4**	**332.6**	**141.0**	**191.6**	**91.2**

Capital Users

HCC provides two key measurable benefits for Capital Users over personal unsecured debt:

- Improved earning potential through access to networks and advice provided by Capital Users
- Reduced cost of capital due to an instrument which better matches risk and reward for Capital Providers

Figure 2: Capital User benefit to lifetime financial position from HCC

Benefit	Lifetime Benefit
Improved Earnings	£39,886
Reduced Cost of Capital	£133,727

Note: The individual benefit of £91,000 per individual assumes only individuals that gain economic benefit from a university degree undertake it. For this reason, the individual net benefit is less than the sum of improved earnings and the reduced cost of capital.

Net Benefit

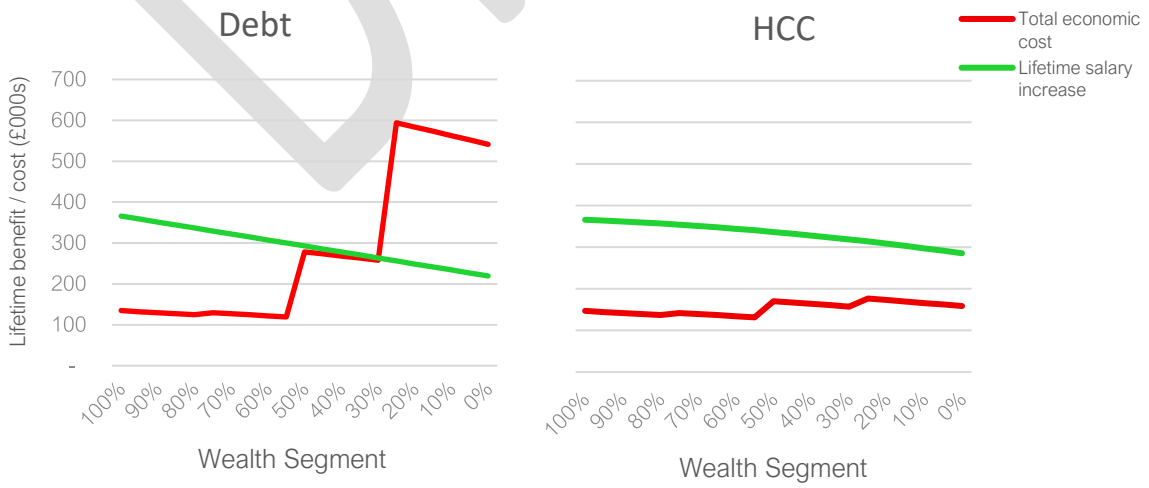
In a financial system without HCC the net benefits of studying accrued to those of above average earnings only (Figure 3 LHS). Those in the bottom quartile were financially worse off from completing further education.

While all segments saw an increase in income from further education this was marginally lower for poorer segments of the economy. However, the main driver of the net benefit degradation for the poorer segments was the increased total cost of a degree amplified by the cost of capital paid. In contrast, the net benefits of further study in a financial system with access to HCCs accrued to all income percentiles (Figure 3 RHS).

While the benefit of completing a degree was still greater for the wealthier segments it was relatively more equal across wealth segments, driven by two factors. Firstly, improved earning potential for graduates in poorer segments from increased access to networks and advice. Secondly, the large fall in the cost of capital for poorer segments driven by better matching of risk and reward for poorer segments of society with variable and uncertain future incomes through HCC.

The net benefit accrued from further education increased from an average of £100K per person without HCC to £192K with HCC (Figure 1).

Figure 3: Economic cost and benefit of a degree by wealth segment for each financing method



Earnings

Graduates earn £467,000 more over their working lifetimes than their peers whose highest educational attainment is an A-level (highest secondary education) (Figure 4), (Office for National Statistics (UK), 2017). Discounted (to reflect the preference for current wealth over future wealth) at a rate of 2% this is £293,000 extra lifetime earnings in real terms by graduates over non-graduates.

Graduate incomes are 18% higher for the wealthier half of graduates. This is largely due to access to networks and advice that are unavailable for poorer segments. The introduction of HCC gives an incentive for Capital Providers (who are almost exclusively from higher earning segments of the population) to provide access to networks and advice for Capital Users. This increases average graduate lifetime income by £40,000 per individual, with those in the poorest segment receiving the highest increase (30%) (Figure 4).

Figure 4: Lifetime earning benefit of an under-graduate degree compared with A-levels only

Wealth Segment	Non-HCC Lifetime Earning Uplift	HCC Lifetime Earning Uplift	Salary Multiple from Mentoring
100%	365.9	365.9	1.00
95%	358.6	364.0	1.02
90%	351.3	361.8	1.03
85%	344.0	359.5	1.05
80%	336.7	356.9	1.06
75%	329.3	354.0	1.08
70%	322.0	351.0	1.09
65%	314.7	347.7	1.11
60%	307.4	344.3	1.12
55%	300.1	340.6	1.14
50%	292.7	336.7	1.15
45%	285.4	332.5	1.17
40%	278.1	328.2	1.18
35%	270.8	323.6	1.20
30%	263.5	318.8	1.21
25%	256.2	313.8	1.23
20%	248.8	308.6	1.24
15%	241.5	303.1	1.26
10%	234.2	297.4	1.27
5%	226.9	291.5	1.29
0%	219.6	285.4	1.30

Cost

The nominal cost of a degree was higher for wealthier segments due to a higher discretionary living expense and higher opportunity cost of time spent studying. Despite this poorer wealth segments paid substantially more for a degree in economic terms, driven by the cost of capital. Without HCC this was substantial (C in Figure 5; wealthiest = 1.16x financial cost over 10 years vs poorest = 9.64x financial cost over 10 years). With HCC there was a marked reduction in the cost of capital for the poorest segments of society (C in Figure 6 relative to C in Figure 5 in; poorest quartile = 1.16x vs 2.37x) resulting in the total cost of

the degree being 71% cheaper under HCC for the poorest segment of society, a saving of £356K.

Figure 5: Economic cost of further education by wealth segment without access to human capital contracts £000's

	A	*B*	*C*	*D = C.(A+B)*	*E*	*D+E*
Wealth Segment	Degree cost	Expenses cost	Cost of capital multiple	Total financial cost	Opportunity cost	Total economic cost
100%	27.8	42.0	1.2	80.9	53.8	134.7
95%	27.8	41.1	1.2	79.9	52.3	132.2
90%	27.8	40.2	1.2	78.9	50.8	129.6
85%	27.8	39.3	1.2	77.8	49.3	127.1
80%	27.8	38.4	1.2	76.8	47.8	124.5
75%	27.8	37.5	1.3	83.5	46.3	129.8
70%	27.8	36.6	1.3	82.4	44.8	127.1
65%	27.8	35.7	1.3	81.2	43.3	124.5
60%	27.8	34.8	1.3	80.1	41.8	121.8
55%	27.8	33.9	1.3	78.9	40.3	119.2
50%	27.8	33.0	3.9	239.4	38.8	278.2
45%	27.8	32.1	3.9	235.9	37.3	273.2
40%	27.8	31.2	3.9	232.3	35.8	268.1
35%	27.8	30.3	3.9	228.8	34.3	263.1
30%	27.8	29.4	3.9	225.2	32.8	258.0
25%	27.8	28.5	9.2	519.7	31.3	551.0
20%	27.8	27.6	9.2	511.4	29.8	541.2
15%	27.8	26.7	9.2	503.1	28.3	531.3
10%	27.8	25.8	9.2	494.7	26.8	521.5
5%	27.8	24.9	9.2	486.4	25.3	511.7
0%	27.8	24.0	9.2	478.1	23.8	501.9

Figure 6: Economic cost of further education by wealth segment with access to human capital contracts £000's

	A	*B*	*C*	*D = C.(A+B)*	*E*	*D+E*
Wealth Segment	Degree cost	Expenses cost	Cost of capital multiple	Total financial cost	Opportunity cost	Total economic cost
100%	27.8	42.0	1.2	80.9	53.8	134.7
95%	27.8	41.1	1.2	79.9	52.3	132.2
90%	27.8	40.2	1.2	78.9	50.8	129.6
85%	27.8	39.3	1.2	77.8	49.3	127.1
80%	27.8	38.4	1.2	76.8	47.8	124.5
75%	27.8	37.5	1.3	83.5	46.3	129.8
70%	27.8	36.6	1.3	82.4	44.8	127.1
65%	27.8	35.7	1.3	81.2	43.3	124.5
60%	27.8	34.8	1.3	80.1	41.8	121.8
55%	27.8	33.9	1.3	78.9	40.3	119.2
50%	27.8	33.0	2.0	119.5	38.8	158.3
45%	27.8	32.1	2.0	117.7	37.3	155.0
40%	27.8	31.2	2.0	116.0	35.8	151.7
35%	27.8	30.3	2.0	114.2	34.3	148.5
30%	27.8	29.4	2.0	112.4	32.8	145.2
25%	27.8	28.5	2.4	133.2	31.3	164.4
20%	27.8	27.6	2.4	131.0	29.8	160.8
15%	27.8	26.7	2.4	128.9	28.3	157.2
10%	27.8	25.8	2.4	126.8	26.8	153.5
5%	27.8	24.9	2.4	124.6	25.3	149.9
0%	27.8	24.0	2.4	122.5	23.8	146.3

Capital Providers

HCC provide three key benefits for Capital Providers when compared to personal unsecured debt: The downside protection and upside participation benefits lead to 25.4% higher capital returns on average than an equivalent debt product. This can be increased further through individual Capital User pricing (Individual Selectivity) and providing Capital User's with access to networks and advice up to a total of 53.7% total increase in portfolio yield relative to a comparable debt product.

- Downside protection:
  - the deferment of any payments where essential expenses exceed income
  - insultation from default due to perfect correlation of payments and Capital User's income
- Upside exposure – participation in the Capital User's success and ability to provide access to networks and advice
- Individual selectivity – selection and rate setting based on an individual's future earning potential

Figure 7: Capital Provider Benefit to Yield from HCC

Benefit	Impact
Downside Protection	53.0% *Lower defaults*
Upside Participation	33.4% *Higher yield on above average returns*
Individual Selectivity	14.3% *Higher return from perfect selectivity*

Note: Based on an equivalent average expected return for personal unsecured debt, holding all else constant for each analysis

Downside Protection

HCC limits downside risk relative to debt by reducing the probability of a default by 22.8%. It does this through two mechanisms. a) The deferment of repayments and b) the affordability of repayments.

A graduate's income shows a very strong tendency to rise as the term of the financing contract increases (Figure 4). In our scenario 49% of the repayment capital due would be repaid by graduates in the first year of graduation compared to 72% in the tenth year (Figure 8).

a) Capital provided for users to invest in education has no saleable security against which to reclaim. This means a mechanism that enables Capital Users the ability to defer repayments when they are unable to pay (their income is not sufficient to cover basic expenses) rather than defaulting is beneficial for the Capital Provider as a default situation is likely to have very low reclamation rates (we have assumed 10% through factoring). Deferring payments to a future data has an opportunity cost of capital (5% assumed) but this is outweighed for on aggregate under a HCC framework by the additional upside exposure gained from higher future Capital User income and higher corresponding repayments (Figure 12).

b) As repayments are always affordable under a HCC, a period of low repayments will not trigger a default event leading to a higher proportion of capital repaid over the credit period.

Figure 8: Downside Risk by Instrument (percentages of expected returns lost through default)

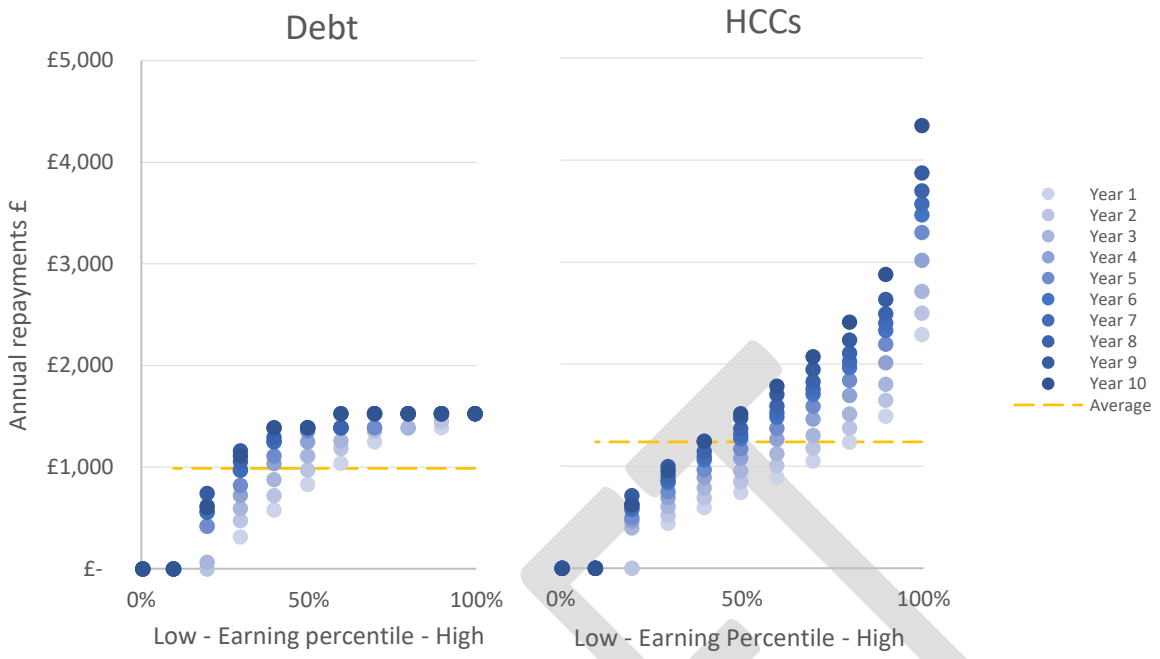
	Written-off	Portfolio Loss
Debt	51%	48%
HCC	28%	25%

Note: The portfolio impact estimates the effect of factoring for debt and the deferral to future higher incomes for HCC.

Upside Participation

HCC provides Capital Providers with exposure to the Capital Users upside which provides the largest boost to total returns over debt. Debt has a limited upside equal to the agreed repayment schedule. Repayments under a HCC are lower for income earners in the mid low income segments in the earlier years of a career when income is less. However, this is more than compensated for by participation in higher future earnings in later years and the participation in high income earners success. This leads to 33.4% higher returns on above average income earning Capital Users (Figure 9).

Figure 9: Repayments by year since graduation and earning percentile



Participation in upside by Capital Providers also gives an incentive to provide access to networks and advice. Access which is much more likely to be attainable by those with wealth (the Capital Providers). The effect of this access is a 14.0% higher yield through higher Capital User incomes.

Thus these two upside participation effects drive returns 39.4% higher for a portfolio of HCCs compared to a comparable debt portfolio.

Individual Selectivity

If HCCs are determined on an individual by individual basis and sufficient data exists to determine in advance the future earning potential of an individual, the yield on a portfolio of HCCs can be further increased by up to 14.3% p.a. (100th percentile earner ROI – 50th percentile earner ROI; Figure 14). This additional ROI however may not accrue in full to the Capital Provider. If information is transparently shared with both Capital Provider and user, this information is trusted by both parties, and there is competition amongst Capital Providers much of this additional value will go to the Capital User in the form of a lower proportion of income sold for a given amount of capital.

Discussion

Regulatory Constraints

The *Consumer Credit Act 1974* governs all financial entitlements provided to a person in return for a future stream of income. Currently this is the only framework within the UK under which a HCC can be governed as the framework for the provision of credit to an individual. This Act has been reinforced with amendments that protect consumers against debt providers. However, these constrain the creation of HCC in two key areas:

a) The Consumer Credit (Early Settlement) Regulations 2004 (Parliament, 2005) – determines that Capital Users have the right to "discharge their indebtedness" at any time by repaying what is owed and no undue penalty can be imposed upon the Capital User for exiting the agreement.

There are two key issues with this. The first is determining what is owed, as unlike debt there is no capital and interest component of a HCC. The second, and more pressing issue, is that at the time the HCC is entered into both the Capital User and Capital Provider base there willingness to transact at different price points by taking into account the unknown future earnings of the Capital User. If the Capital User is allowed at any future point to exit this agreement as their future earning potential becomes better known this makes the agreement ineffective similar to Akerloff Lemons scenario (Akerloff, 1970). Under this scenario Capital Providers will be left with only the Capital Users with low earnings making their portfolio unattractive unless they raised capital costs to levels that assume all individuals are low earning individuals.

b) The Consumer Credit (Total Charge for Credit) Regulations 2010 (Parliament, 2010) – states the total charge for credit expressed annually must be expressed to the consumer within the contract for the credit.

This presents a problem for HCC as the Capital User's future earnings are unknown and thus the total repaid compared to the amount initially invested (the total cost of capital) is unknown.

Market Perception

There is a prevailing market perception that this instrument would represent indentured servitude. To counteract this, it is crucial that two things exist. Firstly, information must be transparently provided to both sides as to how this instrument is likely to affect them. Secondly, and most importantly, thresholds must exist to limit the percentage of income that can be sold (we suggest no more than 12%), the contract must be limited in the number of payments (i.e. not last for a lifetime) and have a maximum amount that must be paid. Furthermore, controls should be in place to ensure that Capital Providers have no authority over any decisions made by the individual.

If the above controls and thresholds are honoured this instrument has the potential to provide access to capital for individuals in a way that allows them to make future decisions freely and unbound by a financial obligation that binds them to a stream of fixed repayments or alternatively to financial blacklisting as is the case with debt financing. Over time market perceptions of consumers will evolve through evidence of the experience of early adopters.

Practical Constraints

A key constraint to commercialisation is the complexity of operations required to make HCCs work effectively.

Essential Expenses

Part of the benefit of HCCs for Capital Users is that they ensure the Capital User doesn't need to make repayments until they have satisfied their basic expenses. What constitutes 'basic expenses' is likely to vary greatly based on a individual's family and geographical situation. Reducing repayments to ensure that this basic expense is available is likely to add significant complexity to the calculation of repayments compared to debt where repayments are fixed.

Validation of pre-investment information

To price HCCs on an individual Capital User basis, sufficient information needs to be collected to estimate their earning potential. The individual on whom the information is based has a strong incentive to make the data look like they have a higher earning potential to achieve a more favourable price for their future income.

Analysis of pre-investment information

For equity in businesses there are a raft of studies and empirical datasets attempting to correlate earnings of a business with pre-investment variables. For people however, this is much less studied. This means the potential for an analysis to be incorrect is greater, it also means that an analysis that more accurately channels capital to talent is likely to find greater short-term profits than an equivalent one in a well-established investment market. Regardless of this trade off the analysis of earning potential is more complex than for debt.

Verification of post-graduation income

Capital User income needs to be verified to calculate appropriate repayments. Capital Users have an incentive to reduce the reported rate of their income to minimise their repayments. Effective mechanisms to verify gross income must exist.

Pipeline of Capital Supply

Anecdotal market research by the author in the UK, suggests for the risk profile that this investment represents, a yield of 6-8% ROI would be required for institutional (wealth management institutions) Capital Providers and 5-10% for retail Capital Providers. There are two factors that need to be considered here. The first is that this market research was conducted in a time of very low yields to capital (Feb-May 2018) putting downward pressure on ROI estimates. The second is that this instrument is new and thus the perceived risk is likely to be higher than reality, placing upward pressure on ROI estimates.

Costs

There will inevitably be restructuring costs to the personal finance market if HCC's were adopted at scale.

For Capital Users from wealthy segments there would be higher competition for places negatively impacting the less talented. Wealthy segments would also face a relatively lower salary as income earning potential becomes more equal.

Capital Providers who finance further education currently as debt-based institutions would be at a distinct disadvantage to early movers in the industry. Early movers would be able to

validate predictive earnings models and hold a data advantage over future challengers. Debt based firms typically price downside risk and the adaptation could be significant.

Conclusion

The introduction of HCC into the UK market would add substantial value to the economy, benefitting both Capital Users and Capital Providers.

Capital Users benefit from two key benefits of HCCs over their lifetime with the majority of these benefits accruing to less wealthy segments of society.

1. A reduction in the total cost of further education to poorer segments of the economy through a framework that better matches risk and reward for a Capital User with a variable and upward trending income profile.
2. Less wealthy Capital Users align the interests of Wealthier Capital Providers with their own. Thus, incentivising Capital Provider facilitation of access to the networks and advice that are usually accessible only to wealthy Capital Users.

Capital Providers benefit from three key features of HCCs which lead to better risk weighted returns to capital.

1. The downside risk of investment is greatly reduced by mitigating the most common reason for Capital User default, inability to repay. This is due to correlation of repayments with income making repayments substantially more affordable at all income levels.
2. The upside potential of the capital investment is not capped as it is with debt financing. This means Capital Providers gains are higher from Capital Users who do well.
3. Capital Providers can select the Capital Users who will be most likely to earn high incomes in future. Effective selection will further increase their returns. This also provides an incentive for Capital Users to finance the talent that will be most in demand by the economy in future (as reflected by future wages).

There are two key constraints to realising these benefits.

1. Regulatory framework that is designed for debt and contains key clauses that act as barriers for HCC.
2. A complex operational model due to the many data points that need to be collected, analysed and verified. This is made more difficult by the incentive Capital User's have to misrepresent this data for financial gain.

There may be some areas of the economy who lose out, especially wealthier but less talented Capital Users and slow moving further education debt providers. On balance however, the economy would see a substantial windfall equivalent to an additional 1-2% GDP growth per years if HCC were to overcome regulatory and operational constraints.

Appendix

Figure 10: Earnings by graduates and A-Levels only by age (2016/17 income levels)

Age	Graduates	Highest qualification is an A level or equivalent qualification (excluding apprenticeships)	Delta
21	£14,881.00	£14,676.00	£ 205.00
22	£16,955.00	£15,131.00	£ 1,824.00
23	£19,076.00	£16,293.00	£ 2,783.00
24	£21,542.00	£17,300.00	£ 4,242.00
25	£23,375.00	£18,170.00	£ 5,205.00
26	£25,440.00	£18,764.00	£ 6,676.00
27	£26,182.00	£18,774.00	£ 7,408.00
28	£27,324.00	£19,431.00	£ 7,893.00
29	£29,448.00	£19,944.00	£ 9,504.00
30	£30,308.00	£20,676.00	£ 9,632.00
31	£31,391.00	£20,973.00	£10,418.00
32	£31,384.00	£20,682.00	£10,702.00
33	£32,510.00	£21,460.00	£11,050.00
34	£32,532.00	£22,047.00	£10,485.00
35	£33,335.00	£21,104.00	£12,231.00
36	£33,960.00	£21,940.00	£12,020.00
37	£33,712.00	£21,525.00	£12,187.00
38	£33,907.00	£21,086.00	£12,821.00
39	£35,169.00	£22,294.00	£12,875.00
40	£35,401.00	£21,519.00	£13,882.00
41	£35,467.00	£21,693.00	£13,774.00
42	£35,444.00	£21,704.00	£13,740.00
43	£35,401.00	£22,909.00	£12,492.00
44	£35,040.00	£22,295.00	£12,745.00
45	£35,677.00	£22,318.00	£13,359.00
46	£35,225.00	£22,261.00	£12,964.00
47	£35,297.00	£21,830.00	£13,467.00
48	£36,279.00	£22,739.00	£13,540.00
49	£35,357.00	£23,777.00	£11,580.00
50	£36,034.00	£22,148.00	£13,886.00
51	£36,082.00	£21,873.00	£14,209.00
52	£34,870.00	£21,812.00	£13,058.00
53	£35,386.00	£22,272.00	£13,114.00
54	£35,922.00	£21,822.00	£14,100.00
55	£35,267.00	£22,556.00	£12,711.00
56	£34,337.00	£20,694.00	£13,643.00
57	£33,402.00	£20,175.00	£13,227.00
58	£32,770.00	£20,771.00	£11,999.00
59	£32,257.00	£20,528.00	£11,729.00
60	£29,292.00	£19,460.00	£ 9,832.00
61	£28,207.00	£18,419.00	£ 9,788.00
62	£27,139.00	£17,719.00	£ 9,420.00
63	£23,858.00	£17,158.00	£ 6,700.00
64	£24,458.00	£16,984.00	£ 7,474.00

Figure 11: Net impact on the UK economy of HCC availability to Capital Users in £

Wealth Segment	Individual Net Benefit from HCC	Population per segment per year	Economy Net Benefit from HCC
100% - Richest	-	18,895	-
95%	5,379	18,895	101,636,732
90%	10,539	18,895	199,125,026
85%	15,479	18,895	292,464,882
80%	20,199	18,895	381,656,300
75%	24,700	18,895	466,699,280
70%	28,982	18,895	547,593,822
65%	33,043	18,895	624,339,926
60%	36,886	18,895	696,937,592
55%	40,508	18,895	765,386,819
50%	163,838	18,895	3,095,640,756
45%	165,245	18,895	3,122,223,432
40%	166,432	18,895	3,144,657,669
35%	167,400	18,895	3,162,943,468
30%	168,148	18,895	3,177,080,830
25%	149,346	18,895	2,821,812,781
20%	147,744	18,895	2,791,540,562
15%	145,922	18,895	2,757,119,905
10%	143,881	18,895	2,718,550,810
5%	141,620	18,895	2,675,833,277
0% - Poorest	139,139	18,895	2,628,967,070
			36,172,210,939

Figure 12: Capital User Repayment Rates and the Portfolio Impact

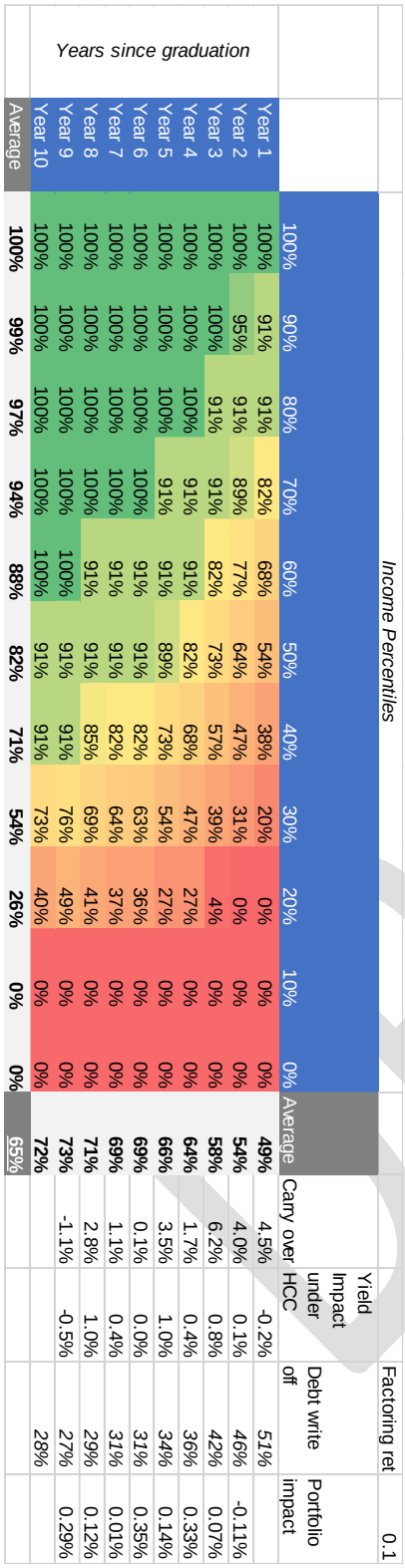


Figure 13: Capital User Repayments by Year Since Graduation

Years Since Graduation	Full repayments made	Proportion of capital repaid
Year 1	9%	49%
Year 2	9%	54%
Year 3	18%	58%
Year 4	27%	64%
Year 5	27%	66%
Year 6	36%	69%
Year 7	36%	69%
Year 8	36%	71%
Year 9	45%	73%
Year 10	45%	72%

Figure 14: Capital flows for 20 years by earning segment from 100th to 50th including Capital Provider ROI per annum received

	100%	90%	80%	70%	60%	50%
	-15000	-15000	-15000	-15000	-15000	**-15000**
Year 1	**£ 2,290**	£ 1,491	£ 1,235	£ 1,050	£ 892	**£ 744**
Year 2	**£ 2,500**	£ 1,646	£ 1,372	£ 1,174	£ 1,006	**£ 848**
Year 3	**£ 2,712**	£ 1,804	£ 1,512	£ 1,302	£ 1,122	**£ 954**
Year 4	**£ 3,017**	£ 2,015	£ 1,693	£ 1,461	£ 1,262	**£ 1,077**
Year 5	**£ 3,290**	£ 2,194	£ 1,842	£ 1,588	£ 1,371	**£ 1,169**
Year 6	**£ 3,464**	£ 2,331	£ 1,968	£ 1,705	£ 1,481	**£ 1,272**
Year 7	**£ 3,571**	£ 2,402	£ 2,027	£ 1,756	£ 1,525	**£ 1,309**
Year 8	**£ 3,698**	£ 2,493	£ 2,106	£ 1,827	£ 1,589	**£ 1,366**
Year 9	**£ 3,875**	£ 2,633	£ 2,235	£ 1,947	£ 1,702	**£ 1,472**
Year 10	**£ 4,338**	£ 2,879	£ 2,411	£ 2,074	£ 1,785	**£ 1,515**
Year 11	**£ 5,208**	£ 3,478	£ 2,923	£ 2,523	£ 2,181	**£ 1,861**
Year 12	**£ 5,207**	£ 3,478	£ 2,923	£ 2,522	£ 2,180	**£ 1,861**
Year 13	**£ 5,274**	£ 3,545	£ 2,989	£ 2,589	£ 2,247	**£ 1,927**
Year 14	**£ 5,276**	£ 3,546	£ 2,991	£ 2,590	£ 2,248	**£ 1,929**
Year 15	**£ 5,323**	£ 3,594	£ 3,038	£ 2,638	£ 2,296	**£ 1,976**
Year 16	**£ 5,360**	£ 3,631	£ 3,075	£ 2,675	£ 2,333	**£ 2,013**
Year 17	**£ 5,345**	£ 3,616	£ 3,061	£ 2,660	£ 2,318	**£ 1,999**
Year 18	**£ 5,357**	£ 3,627	£ 3,072	£ 2,672	£ 2,330	**£ 2,010**
Year 19	**£ 5,432**	£ 3,702	£ 3,147	£ 2,747	£ 2,405	**£ 2,085**
Year 20	**£ 5,446**	£ 3,716	£ 3,161	£ 2,760	£ 2,418	**£ 2,099**
ROI p.a.	**21.2%**	14.6%	12.2%	10.3%	8.6%	**6.9%**

References

BBC. (2017, December 4). *What do we mean when we talk about poverty?* Retrieved from BBC: https://www.bbc.co.uk/news/uk-42223497

Britton, J. (2017, November 17). *The degrees that make you rich...and the ones that don't.* Retrieved from Institute of Fiscal Studies: https://www.ifs.org.uk/publications/10177

Cooper, K., & Stewart, K. (2013, October 22). *Does money affect children's outcomes?* Retrieved from Joseph Rowntree Foundation: https://www.jrf.org.uk/report/does-money-affect-children%E2%80%99s-outcomes

Duvall, A. J. (2016, December 1). *Calculating a Mentor's Effect on Salary and Retention.* Retrieved from Financial Management: https://www.fm-magazine.com/issues/2016/dec/mentors-effect-on-salary-and-retention.html

Friedman, M. (1955). *Role of Government in Education.* Retrieved from University of Texas: https://la.utexas.edu/users/hcleaver/330T/350kPEEFriedmanRoleOfGovttable.pdf

Future Finance. (2018, July 16). *Our Loans*. Retrieved from Future Finance: https://www.futurefinance.com/uk/pages/our-loans/

Leef, G. (2014, March 26). *Opinion.* Retrieved from Forbes: https://www.forbes.com/sites/georgeleef/2014/03/26/equity-is-better-than-debt-in-financing-higher-education/#15a96fdd7cf6

Office for National Statistics (UK). (2017, November 2017). *Graduates in the UK labour market: 2017.* Retrieved from Office for National Statistics: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/graduatesintheuklabourmarket/2017

Parliament. (2005, May 31). *The Consumer Credit (Early Settlement) Regulations 2004.* Retrieved from Legislation UK: https://www.legislation.gov.uk/uksi/2004/1483/made?view=plain

Parliament. (2010, March 30). *The Consumer Credit (Total Charge for Credit) Regulations 2010.* Retrieved from Legislation UK: http://www.legislation.gov.uk/uksi/2010/1011/made

Statista. (2018, July 17). *Population of the United Kingdom in 2016, by age group.* Retrieved from Statista: The Statistics Portal: https://www.statista.com/statistics/281174/uk-population-by-age/

The Guardian. (2008, July 2). *Basic standard of living costs £13,400.* Retrieved from Guardian: https://www.theguardian.com/uk/2008/jul/02/welfare

The Roosevelt Institute Centre on International Development. (2015, December). *The Global Viability of Human Capital Contracts.* Retrieved from Yale University: http://static1.squarespace.com/static/549b9425e4b07bee0353cf88/t/56aad58c0ab37725a38581c3/1454036366091/HumanCapitalContractsFinal.pdf

The Times. (2017, December 1). *The cost of studying at a university in the UK.* Retrieved from Times Higher Education World University Rankings: https://www.timeshighereducation.com/student/advice/cost-studying-university-uk#survey-answer

Vice Magazine. (2014, October 13). *Human Capital Contracts Could Revolutionise the Way We Borrow Money.* Retrieved from Vice: https://www.vice.com/en_uk/article/vdpagm/rumpelstiltskin-loans-0000466-v21n10