Examining the Role of Life Satisfaction and Job Satisfaction in the Differential Educational Returns of Australian Entrepreneurs and Employees

Research Report[u7382854]

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Introduction and Overview

Understanding the returns to formal education is one of the most studied topics in labor economics, and it has long been a topic of interest to economists and policymakers. Education is regarded as one of the crucial factors in enhancing individual productivity, leading to higher income and better job prospects. According to (Mincer, 1974), the positive relationship between an individual's education and their subsequent earnings can be attributed to the productivity-enhancing effects of education. A lot of literature has studied the return to formal education for employees/wage workers to understand and address problems related to income inequality, economic productivity, and social mobility. However, the literature that studies returns to formal education to entrepreneurs and the differential returns to entrepreneurs and employees is relatively new and needs further development.

Entrepreneurship plays a vital role in the economy and is often seen as drivers of new ideas, job creation, and economic growth. However, entrepreneurship also involves considerable risk and uncertainty, making the returns to formal education for entrepreneurs potentially different from those for employees/wage workers who are in a more stable salaried position.

The study by (Hessels et al., 2020) is critical literature in this area and provides valuable insights into understanding the differential returns to education for entrepreneurs vs employees. The study replicated and extended the research findings of another core literature on the topic by (Van Praag, van Witteloostuijn and van der Sluis, 2013), which was based on U.S data. The (Hessels et al., 2020) paper replicated the U.S study for Australia using the data from the Household, Income and Labor Dynamics in Australia (HILDA) Survey from 2005 to 2017. The authors found that, in Australia, the returns to formal education are indeed higher for entrepreneurs compared to employees. Notably, this higher return is primarily observed among entrepreneurs without employees. The study also explored whether job control mediates the relationship between education and income but found limited evidence supporting job control as a significant mediating factor, as suggested by (Van Praag, van Witteloostuijn and van der Sluis, 2013)

Our research aims to replicate the study by Hessels et al. (2020) and extend it by including additional variables such as life satisfaction and job satisfaction. By incorporating these new variables, we aim to provide a more comprehensive understanding of the factors that influence the returns to education and explore whether these personal well-being factors mediate the relationship between education and income for entrepreneurs and employees. This extension seeks to address potential gaps in the original study and offer deeper insights into the broader determinants of economic returns to education.

Literature Review

The relationship between education and income is widely studied and is one of the central themes in Labor Economics. One of the seminal works that studied returns to education for employees/wageworkers is the study by (Mincer, 1974), which introduced the Mincer earnings equation. This equation relates an individual's earnings to their years of schooling and work experience, providing a comprehensive analysis of the human capital model. The equation is given as follows:

$$\ln(Earnings) = \alpha + \rho(Schooling) + \beta_1(Experience) + \beta_2(Experience)^2 + \epsilon$$

According to the model, each additional year of schooling significantly increases an individual's earnings. The rate of return to education is typically estimated to be around 5-10% per additional year of schooling. He also argues that the relationship between work experience and earnings is quadratic. Earnings increase with experience but at a decreasing rate, capturing the idea of diminishing marginal returns to experience. Various other literature has also validated this model and reached similar findings. The positive correlation between education and income is attributed to education enhancing productivity and skills, which increases the earning potential for employees.

In contrast, the literature on returns to education for entrepreneurs is relatively new and has a lot more to be studied and explored. Entrepreneurs face different challenges and opportunities compared to wageworkers, which could potentially lead to different returns to education. The study by (Van Praag, van Witteloostuijn and van der Sluis, 2013) explores the differential impact of formal education on the earnings of entrepreneurs compared to employees in the U. S. The study finds that the returns to formal education for entrepreneurs are significantly higher when compared to the employees. This result implies that each additional year of education translates to a larger increase in earnings for entrepreneurs. The (Van Praag, van Witteloostuijn, and van der Sluis, 2013) study also suggested personal control as a potential mechanism that explained the higher returns to education for entrepreneurs. According to the study, entrepreneurs enjoy greater personal control over their work and possess the ability to adapt their business strategies to maximize returns. This flexibility allows entrepreneurs to capitalize on their educational background more effectively than employees, who may be constrained by organizational structures and job roles.

The study by(Hessels et al., 2020) uses the data from the Household, Income and Labor Dynamics in Australia (HILDA) Survey from 2005 to 2017 to replicate and extend the findings of (Van Praag, van Witteloostuijn and van der Sluis, 2013) study which uses U.S data. The (Hessels et al., 2020) study was able to replicate most of the key findings of the U. S. study. The paper found that, in Australia, the returns to formal education are indeed higher for entrepreneurs compared to employees. Notably, this higher return is primarily observed among entrepreneurs without employees. The study also found little evidence supporting the claim that job control mediates the relationship between education and income.

There has been extensive literature done on factors affecting returns to education, and we are interested in additional factors that can influence returns to formal education, particularly for entrepreneurs. The (Diener and Chan, 2011) study explores the relationship between subjective well-being(SWB) and health outcomes. One of the core cognitive components of SWB is life satisfaction. According to this study, people who report higher life satisfaction are likely to live longer, as their state of contentment and fulfillment positively influences their physical health. Entrepreneurs who are happier and more satisfied with their lives may be better equipped to handle the stresses and demands of running a business, thus achieving higher returns from their education. According to (Wiklund et al., 2019), entrepreneurial well-being is defined as the experience of satisfaction (life satisfaction), positive effects, infrequent negative effects, and psychological functioning derived from running an entrepreneurial venture. The paper suggests that promoting life satisfaction among entrepreneurs through policies aimed at improving work-life balance and mental health support would lead to positive health outcomes, which would increase productivity and may further increase the returns to formal education.

The study by(Judge et al., 2001) explores the relationship between Job Satisfaction and Job performance. The study explores six different models, which examine different types of

relations between job performance and job satisfaction. According to the paper, there exists a moderate relationship between job satisfaction and job performance(0.30). The paper also points out that this relationship has been historically significant but inconsistently supported. The paper points out that higher job performances often have a positive correlation to job satisfaction. It is possible that higher education may play a significant role in job performance, which in turn affects job satisfaction; the reverse relation is also a possibility that (Judge et al., 2001) paper studies. According to one of the models, job satisfaction leads to better morale and productivity, which in turn leads to higher job performance and higher returns on education.

Data and Methods

Data

We use the same data set used in the study by (Hessels et al., 2020), the longitudinal data from the Household, Income, and Labor Dynamics in Australia (HILDA) Survey (2005–2017) for our replication and extension study. After the data cleaning process, our dataset contains 87,117-person-year observations for employees and entrepreneurs aged between 16 and 64. The (Hessels et al., 2020) study dataset comprised 92,591 person-year observations from 16,293 individuals aged 16 to 64; the difference in person-year observations can be attributed to the order in which we cleaned the data, which may be significantly different from the one done by the (Hessels et al., 2020) paper.

Variables

Following the (Hessels et al., 2020) study, we use Gross Labor Income as our dependent variable, which is defined as the total of an individual's gross wage/salary income and business income per year, logarithmically transformed. Observations with negative or zero income are excluded. We also closely follow the paper to define our Independent Variables and Control Variables. For the independent variables, we define entrepreneurship based on whether individuals own or direct a business, with or without employees(entrepreneurs =1 and employees =0). To ensure a focus on significant entrepreneurial activity, we exclude entrepreneurs working fewer than 300 hours per year and those engaged in farming. Education is measured in years of completed schooling, ranging from eight to seventeen years, combining the highest year of school completed and the highest post-school qualification attained. Job control is assessed through responses to survey questions about job-related autonomy and decision-making authority using ordinal ranking. The average of these responses is standardized, with higher scores indicating greater job control.

In addition to the main variables, we include several control variables to account for other factors that might influence the outcomes. These control variables include demographic factors such as age, gender (male=1, female=0), and marital status (married=1, not married=0). Health status is self-reported and categorized as poor/fair (1) or good/very good/excellent (0). We also consider the education levels of the respondents' parents, categorized from no education to higher education. Geographic location is controlled for using dummy variables representing the eight Australian states and territories. Additionally, we include a variable indicating whether the individual was born in Australia (1) or not (0). The number of hours worked per week and a composite cognitive ability score derived from standardized test scores on cognitive functions, processed through factor analysis, are also included as control variables. A full picture of the variable is given in Table 1 and Table 2. Table 1 shows the variables and type of

variable directly used from the HILDA survey data, while Table 2 shows the derived variables generated for the purpose of conducting our study.

We also drop all missing values for both numerical variables and text variables following the Missing value conventions mentioned in(Summerfield et al., 2023); see Table 3 and Table 4. The codes for missing values are global throughout the HILDA survey data.

Table 1: Direct Variables from HILDA survey data

Variable Name	Description	Type	Survey Response Type
xwaveid	Unique person identifier across all waves	Identifier	N/A
hhrpid	Random person identifier	Identifier	N/A
wsfei	Financial year gross wages & salary ($) [imputed] [weighted topcode]	Dependent Variable	Continuous
bifip	Financial year business income ($) [imputed] Positive values [weighted topcode]	Dependent Variable	Continuous
bifin	Financial year business income ($) [imputed] Negative values	Dependent Variable	Continuous
esempdt	Current employment status (detailed)	Independent Variable	Categorical
jbmo62	Occupation 2-digit ANZSCO 2006	Independent Variable	Categorical
jbhruc	Hours per week usually worked in all jobs	Independent Variable	Continuous
edhigh	Highest education level achieved	Independent Variable	Ordinal
edhists	Highest year of school completed (excludes equivalents obtained post-school)	Independent Variable	Ordinal
jomfw	I have a lot of freedom to decide when I do my work, range from 1 to 7	Independent Variable	Ordinal
jomls	I have a lot of say about what happens on my job, range from 1 to 7	Independent Variable	Ordinal
jomfd	I have a lot of freedom to decide how I do my own work, range from 1 to 7	Independent Variable	Ordinal
hgage	Age (based on each wave)	Control Variable	Continuous
hgsex	Sex (gender)	Control Variable	Dichotomous
mrcurr	Marital status	Control Variable	Categorical
gh1	Self-assessed health	Control Variable	Ordinal
fmmsch	How much schooling mother completed	Control Variable	Ordinal
fmmpsq	Mother completed an educational qualification after leaving school	Control Variable	Dichotomous
fmfsch	How much schooling father completed	Control Variable	Ordinal
fmfpsq	Father completed an educational qualification after leaving school	Control Variable	Dichotomous
hhstate	Geographical location	Control Variable	Categorical
ancob	History: country of birth	Control Variable	Categorical
ctbds	Backwards digits score	Control Variable	Continuous
ctwps	Word pronunciation score (25-item NART)	Control Variable	Continuous
ctsds	Symbol-digit modalities score	Control Variable	Continuous

Table 2: Derived Variables

Variable Name	Description	Type	Survey Response Type
Gross_Labor_Income	Generated by combining wsfei, bifip, and bifin.	Dependent Variable	Continuous
Log_Gross_Labor_Income	Logarithmic transformation of Gross_Labor_Income.	Dependent Variable	Continuous
Entrepreneur	Categorical variable indicating employment status (Wageworkers, Entrepreneurs with employees, Entrepreneurs without employees).	Independent Variable	Categorical
EntrepreneurGroup	Binary variable indicating whether an individual is an entrepreneur (with or without employees).	Independent Variable	Binary
Annual_Hours_All_Jobs	Generated by multiplying jbhruc (hours per week usually worked in all jobs) by 52.	Independent Variable	Continuous
Occupation_Classification	Categorical variable based on jbmo62 (Occupation 2-digit ANZSCO 2006).	Independent Variable	Categorical
Education	Ordinal variable derived from edhists and edhigh.	Independent Variable	Ordinal
Job_Control	Generated by averaging jomfw, jomls, and jomfd, then standardized.	Independent Variable	Continuous
Year	Generated from the wave variable to represent survey year.	Control Variable	Continuous
Age	Derived from hgage.	Control Variable	Continuous
Gender	Binary variable recoded from hgsex.	Control Variable	Binary
Married	Binary variable recoded from mrcurr.	Control Variable	Binary
Healthy	Binary variable recoded from gh1.	Control Variable	Binary
Education_Father	Categorical variable indicating the education level of the father.	Control Variable	Categorical
Education_Mother	Categorical variable indicating the education level of the mother.	Control Variable	Categorical
Living_In_Territory	Categorical variable representing geographical location based on hhstate.	Control Variable	Categorical
Born_In_Australia	Binary variable derived from ancob indicating if the individual was born in Australia.	Control Variable	Binary
Hours_Worked_Per_Week	Derived from jbhruc.	Control Variable	Continuous
Cognitive_Ability	Factor analysis derived variable from std_res_ctbds, std_res_ctwps, and std_res_ctsds.	Cognitive Ability	Continuous

Table 3: Missing value conventions for Texts

Text	Description
[blank]	Missing information (no reason specified)
-1	Not asked
-2	Not applicable
-3	Don't know
-4	Refused
-7	Unable to determine value
-9	Non-responding household

source:(Summerfield *et al.,* 2023)

Table 4: Missing Value conventions for Numerical Variables

Code	Description
-1	Not asked: question skipped due to answer to a preceding question
-2	Not applicable
-3	Don't know
-4	Refused or not answered
-5	Invalid multiple response (SCQ only)
-6	Value implausible (as determined after intensive checking)
-7	Unable to determine value
-8	No Self-Completion Questionnaire returned and matched to individual record
-9	Non-responding household
-10	Non-responding person (Combined File only)

Source: (Summerfield *et al.,* 2023)

METHODS

For the replication and extension part of our study, we closely follow the original methodology of the (Hessels et al., 2019) paper and (Van Praag, van Witteloostuijn, and van der Sluis, 2013) paper. We also consider the strategy outlined in the replication plan document provided by Hessels (Hessels et al., 2019). We first try to replicate the descriptive statistics in the study by (Hessels et al., 2020). The descriptive statistics provide us with an overview of the data we are working with and also allow us to do a preliminary examination of income and education profiles for Entrepreneurs with employees, Entrepreneurs without employees, and wage workers. We first run a panel regression analysis (re) for the subsamples of entrepreneurs and employees separately.

We do this because we are interested in analyzing the coefficient of education for both subsamples. This is followed by panel regression analysis (random effects) for the combined sample of both entrepreneurs and employees. We also include the interaction term between education and entrepreneurs to study the differential returns to education for Entrepreneurs and employees from the coefficient of the interaction term.

, we also use fixed effects regression to control for time-constant unobserved individual effects

. We also repeat the above regression with and without cognitive ability to examine the impact of cognitive ability on estimated returns to education. We also test the claim by (Van Praag, van Witteloostuijn and van der Sluis, 2013) study that job control acts as a mediating mechanism to explain higher returns to formal education for entrepreneurs compared to employees. The hypotheses from the (Hessels et al., 2020) study that we use to guide our replication are as follows:

Hypothesis 1: The returns to formal education in terms of income are higher for entrepreneurs than for employees.

Hypothesis 2: The higher returns to formal education in terms of income for entrepreneurs compared to employees are explained by the level of control in one's job.

For the extension part of our study, we will be including alternative independent variables that could potentially act as a mediating mechanism, which will possibly explain the higher returns to formal education for entrepreneurs compared to employees. Our methodology for extending the study closely follows our empirical strategy for replication of the (Hessels et al., 2020) study. In our extension, we analyze whether the higher returns to formal education for entrepreneurs compared to employees can be explained by one's life satisfaction or job satisfaction. We expect that the income generated by an additional unit of education is expected to be equal for entrepreneurs and employees if adequately controlled for the level of life satisfaction or job satisfaction. The hypotheses we consider for the extension of the study are as follows:

Hypothesis 3: The higher returns to formal education in terms of income for entrepreneurs compared to employees are explained by the level of one's life satisfaction.

Hypothesis 4: The higher returns to formal education in terms of income for entrepreneurs compared to employees are explained by the level of one's job satisfaction.

Note: The life satisfaction variable and Job satisfaction variable were demeaned for the purpose of centring the variables around the mean. This was done because when directly used the interaction term coefficient Life satisfaction x Education demeaned had around 7000 values that were between -60 and 60 , which resulted in nonsensical regression results.

Results from Replication of (Hessels *et al.*, 2020) **Study:**

Table 5: Descriptive Statistics of the Analysis Sample (Replication)

	ALL		Entrepreneurs without employees		Entrepreneurs with employees		Wageworkers	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Gross labor income (ln)	10.653	0.957	10.45	1.116	10.995	0.942	10.65	0.939
Education	12.901	2.083	12.719	2.073	13.006	2.089	12.91	2.082
Job control	0.009	0.988	0.913	0.787	1.07	0.658	-0.12	0.945
Cognitive ability	0	0.801	-0.007	0.796	0.017	0.761	0	0.803
Age	38.973	12.863	44.485	11.268	45.682	10.046	38.169	12.904
Hours worked per week	37.422	13.67	37.895	15.915	45.719	15.073	36.928	13.243
Gender (Male = 1)	0.502	0.5	0.632	0.482	0.695	0.46	0.481	0.5
Married (=1)	0.684	0.465	0.771	0.42	0.89	0.312	0.666	0.472
Not healthy (=1)	0.091	0.288	0.1	0.3	0.077	0.267	0.091	0.288
Education Father	.	.						
- [1] None	0.006	0.075	0.007	0.084	0.012	0.108	0.005	0.073
- [2] Primary	0.083	0.276	0.107	0.31	0.123	0.328	0.079	0.27
- [3] Some secondary school	0.218	0.413	0.226	0.418	0.218	0.413	0.217	0.412
- [4] Secondary low	0.034	0.181	0.027	0.162	0.04	0.197	0.034	0.181
- [5] Secondary high	0.066	0.249	0.054	0.226	0.058	0.234	0.068	0.252
- [6] Post-secondary	0.593	0.491	0.578	0.494	0.549	0.498	0.596	0.491
Education Mother	.	.						
- [1] None	0.009	0.094	0.012	0.111	0.021	0.145	0.008	0.089
- [2] Primary	0.078	0.268	0.089	0.285	0.103	0.304	0.076	0.264
- [3] Some secondary school	0.316	0.465	0.311	0.463	0.34	0.474	0.315	0.465
- [4] Secondary low	0.069	0.254	0.07	0.255	0.078	0.269	0.069	0.253
- [5] Secondary high	0.105	0.307	0.115	0.319	0.098	0.298	0.105	0.306
- [6] Post-secondary	0.423	0.494	0.403	0.491	0.359	0.48	0.428	0.495
Living In Territory	.	.						
- [1] NSW	0.289	0.453	0.294	0.456	0.291	0.454	0.289	0.453
- [2] VIC	0.255	0.436	0.255	0.436	0.253	0.435	0.256	0.436
- [3] QLD	0.212	0.409	0.22	0.414	0.186	0.389	0.213	0.409
- [4] SA	0.087	0.282	0.086	0.281	0.093	0.291	0.087	0.281
- [5] WA	0.091	0.288	0.099	0.298	0.129	0.335	0.089	0.285
- [6] TAS	0.03	0.17	0.018	0.131	0.025	0.156	0.031	0.173
- [7] NT	0.009	0.094	0.01	0.099	0.006	0.077	0.009	0.095
- [8] ACT	0.026	0.16	0.018	0.132	0.017	0.131	0.027	0.163
Born In Australia	0.808	0.394	0.752	0.432	0.763	0.426	0.814	0.389

Table 5 shows the descriptive statistics for our analysis sample. The replicated descriptive statistics closely mirror the descriptive statistics of the (see Table 1 in Hessels et al., 2020)

study. From the descriptive statistics, we see that entrepreneurs with employees have the highest mean gross labor income(ln) compared to wage workers and entrepreneurs without employees. On the other hand, wageworkers have a higher mean gross labour income(ln) compared to entrepreneurs without employees. This is consistent with results in the (Hessels et al., 2020) study. Another key point that we observe is that the education levels across all groups are relatively same, with wageworkers having a slightly higher mean education level. We also observe that job control is highest for entrepreneurs with employees, closely followed by entrepreneurs without employees, but wageworkers report negative job control values (Mean = -0.102, SD = 0.945).

The cognitive ability (mean) values in our descriptive statistics have a slight difference when compared to the original paper. This could be attributed to the order in which we cleaned the data and the consequent loss in some observations. Cognitive ability scores are relatively similar across all groups, with slight variations; entrepreneurs with employees have a slightly higher mean score of 0.14 (SD = 0.62) compared to wageworkers with a mean of 0.12 (SD = 0.845).

Table 6: The relationship between formal education and income (dependent variable: logarithm of annual income)

A. Cognitive ability not included

	Entrepreneurs (RE)	Employees (RE)	All (RE)	All (FE)
Education	0.118 (0.00497)	0.0904 (0.00119)	0.0936 (0.00129)	
Entrepreneur			-0.580 (0.0465)	-0.691 (0.0624)
Education × Entrepreneur			0.0230 (0.00357)	0.0310 (0.00477)
R²	0.382			
Observations	10,285	76,832	87,117	87,117

B. Cognitive ability included

	Entrepreneurs (RE)	Employees (RE)	All (RE)	All (FE)
Education	0.123 (0.00536)	0.0882 (0.00121)	0.0912 (0.00133)	
Entrepreneur			-0.649 (0.0488)	-0.776 (0.0676)
Education × Entrepreneur			0.0276 (0.00373)	0.0368 (0.00514)
Cognitive Ability	0.0155 (0.0136)	0.0423 (0.00304)	0.0394 (0.00333)	
Ability × Entrepreneur			-0.0121 (0.00986)	-0.00389 (0.0143)
R²	0.383			
Observations	8,634	65,846	74,480	74,480

Table 6 shows the relationship between formal education and income. It shows the results of random effects regressions with Gross Labor Income(ln) as the dependent variable, both without (panel A) and with (panel B) the cognitive ability measure included as a control

variable. Consider panel A, that is, we don't include cognitive ability; column 1 panel A shows that each additional year of education increases income by 11.8 per cent for entrepreneurs. The replicated estimate is higher than the estimate of 9.1 per cent in the original study by (Hessels et al., 2020, See Table 2). Column 2 Panel A, the results in our table shows that each additional year of education increases income by 9.04 per cent for employees, this replicated estimate is also higher than the estimate of 6 per cent in the original study. When comparing the replicated results and the (Hessels et al., 2020) results(see Table 2, panel A), we find that both our estimates for employees and entrepreneurs are higher. When we examine the full sample, particularly the coefficient for the interaction term between Entrepreneurs and Education, the results showed significantly higher returns to education, 2.3 percentage points, for entrepreneurs compared to employees. This replicated interaction term is slightly higher than the original 2.2 percentage points in the(Hessels et al., 2020) paper. The results of the fixed-effects regression in Column 4 panel A reveal a premium of 3.1 percentage points for entrepreneurs, which is higher than the original 2.4 percentage points, suggesting a greater premium for entrepreneurs when accounting for fixed effects in the replicated sample. Now, analyzing panel B for Table 6, we see that including cognitive ability as a control variable does not significantly change the results in panel B when compared to panel A. Hence, we have found that from our replication results, Hypothesis 1 is supported, similar to what we find in the (Hessels et al., 2020) study.

Table 7: The relationship between formal education and income (dependent variable: logarithm of annual income); Models including job control and triple interaction.

A. Cognitive ability not included

	All (RE)	All (FE)
Education (demeaned)	0.0725 (0.00177)	0.0808 (0.00186)
Entrepreneur	-0.324 (0.0123)	-0.306 (0.0163)
Education × Entrepreneur	0.0553 (0.00838)	0.0507 (0.00973)
Job control	0.0828 (0.00281)	0.0643 (0.00386)
Job control × Education (demeaned)	0.00580 (0.00196)	0.00209 (0.00227)
Job control × Entrepreneur	-0.0519 (0.0101)	-0.0455 (0.0134)
Job control × Entrepreneur × Education (demeaned)	-0.0237 (0.00686)	-0.0206 (0.00795)
Observations	87,117	87,117
R^2	0.386	

B. Cognitive ability included

	All (RE)	All (FE)
Education (demeaned)	0.0710 (0.00183)	0.0797 (0.00198)
Entrepreneur	-0.309 (0.0130)	-0.302 (0.0178)
Education × Entrepreneur	0.0638 (0.00890)	0.0588 (0.0107)
Job control	0.0799 (0.00291)	0.0607 (0.00412)
Job control × Education (demeaned)	0.00578 (0.00202)	0.00169 (0.00242)
Job control × Entrepreneur	-0.0735 (0.0107)	-0.0540 (0.0146)
Job control × Entrepreneur × Education (demeaned)	-0.0256 (0.00728)	-0.0238 (0.00878)
Ability	0.0332 (0.00339)	0.0504 (0.00529)
Ability × entrepreneur	0.00337 (0.0100)	0.00279 (0.0142)
Observations	74,480	74,480
R^2	0.387	

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Table 7 shows the relationship between formal education and income when job control is added to the mix. The results from the table are used to analyze whether job control explains the higher returns to education for entrepreneurs compared to employees by examining the reduction in the coefficient of the interaction term Education × Entrepreneur. This analysis follows the same procedure in (Hessels et al., 2020)for assessing mediated moderation. In Panel A, where cognitive ability is not included, the interaction coefficient Education × Entrepreneur in Table 6 without job control is 2.3 percentage points for entrepreneurs compared to employees in the random-effects model, and the fixed-effects regression model shows a premium of 3.1 percentage points for entrepreneurs. When job control is added in Table 7, these values increase, with the random-effects model showing significantly higher returns to education for entrepreneurs, now at 5.53 percentage points, and the fixed-effects regression indicating a premium of 5.07 percentage points for entrepreneurs. Analyzing panel B of Table 7, the inclusion of cognitive ability as a control variable also yields a similar pattern of results. Here, the random-effects model shows returns to education for entrepreneurs at 6.38 percentage points, and the fixed-effects regression indicates a premium of 5.88 percentage points for entrepreneurs, both of which do not show any reduction in the coefficient of interaction term when compared to Table 6 panel B.

Adding job control to the model in Table 7 increases the interaction coefficient Education × Entrepreneur significantly, rather than reducing it. This suggests that job control does not explain the higher returns to education for entrepreneurs compared to employees. Instead, the interaction term remains significant and even higher after including job control, indicating that it is possible that other factors might be contributing to the observed higher returns to education for entrepreneurs. Therefore, hypothesis 2, that job control mediates the relationship between education and income for entrepreneurs compared to employees, is not supported by our replication similar to the findings of the (Hessels et al., 2020) study.

With Table 8, we are analyzing the differential returns to education for entrepreneurs without employees and entrepreneurs with employees. From Table 8, Panel A, we can see that Entrepreneurs without employees in the random effects model (column 3) and fixed effects model have significantly higher returns to education, 2.45 percentage points, and 10.3 percentage points. On the other hand, Entrepreneurs with employees only have 1.25 percentage points for regression effects models and 9.95 percent points for fixed effects models. Overall, Table 8 suggests that entrepreneurs without employees have higher returns to formal education compared to entrepreneurs with employees; our replication findings are in line with the results found in the (Hessels et al., 2020) study. When adding cognitive ability to the regression (see Panel B, Table 8), we observe results similar to those of Panel A. One key difference we see when comparing the replicated Table 8 to Table 4 in the (Hessels et al., 2020) study is that we observe that the fixed effects are larger for our table (Table 8, column 4).

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Table 8: The relationship between formal education and income (dependent variable: logarithm of annual income); Stratified analysis of entrepreneurs without and with employees.

A. Cognitive ability not included

	Entrepreneurs without employees (RE)	Entrepreneurs with employees (RE)	All (RE)	All (FE)
Education	0.118 (0.00687)	0.104 (0.00686)	0.0937 (0.00129)	
Entrepreneur without empl.			-0.678 (0.0588)	-1.717 (0.0777)
Entrepreneur with empl.			-0.330 (0.0704)	-1.465 (0.0949)
Education × Entrepreneur without empl.			0.0245 (0.00455)	0.103 (0.00600)
Education × Entrepreneur with empl.			0.0125 (0.00534)	0.0995 (0.00716)
R^2				0.350
Observations	6051	4234	87117	87117

B. Cognitive Ability Included

	Entrepreneurs without employees (RE)	Entrepreneurs with employees (RE)	All (RE)	All (FE)
Education	0.120 (0.00755)	0.109 (0.00742)	0.0910 (0.00133)	
Entrepreneur without empl.			-0.703 (0.0625)	-1.715 (0.0854)
Entrepreneur with empl.			-0.476 (0.0733)	-1.610 (0.103)
Education × Entrepreneur without empl.			0.0270 (0.00483)	0.103 (0.00657)
Education × Entrepreneur with empl.			0.0209 (0.00552)	0.108 (0.00768)
Ability	0.000876 (0.0182)	0.0171 (0.0196)		
Ability × Entrepreneur without empl.			0.000886 (0.0120)	0.0275 (0.0180)
Ability × Entrepreneur with empl.			0.0604 (0.0147)	0.0670 (0.0214
R^2				0.348
Observations	4991	3643	74480	74480

Table 9

	(1) All (RE)	(2) All (FE)
A. Cognitive ability not included		
Education	0.0898 (0.00130)	
Entrepreneur without employees	-0.775 (0.0692)	-1.498 (0.0987)
Entrepreneur with employees	-0.496 (0.0857)	-1.199 (0.126)
Education × Entrepreneur without employees	0.0332 (0.00547)	0.0850 (0.00779)
Education × Entrepreneur with employees	0.0224 (0.00659)	0.0773 (0.00973)
Job control	0.0584 (0.0165)	0.0913 (0.0233)
Job control × Education	0.000849 (0.00127)	-0.000444 (0.00178)
Job control × Entrepreneur without employees	-0.0882 (0.0120)	-0.0787 (0.0166)
Job control × Entrepreneur with employees	-0.0311 (0.0167)	-0.0631 (0.0232)
Job control × Education × Entrepreneur without employees	-0.0110 (0.00617)	0.0286 (0.00794)
Job control × Education × Entrepreneur with employees	-0.0152 (0.00717)	0.0321 (0.00944)
R^2		0.358
Observations	87117	87117
B. Cognitive ability included		
Education	0.0874 (0.00134)	
Entrepreneur without employees	-0.793 (0.0744)	-1.490 (0.110)
Entrepreneur with employees	-0.611 (0.0899)	-1.427 (0.137)
Education × Entrepreneur without employees	0.0357 (0.00586)	0.0844 (0.00863)
Education × Entrepreneur with employees	0.0325 (0.00684)	0.0949 (0.0105)
Job control	0.0556 (0.0172)	0.0861 (0.0250)
Job control × Education	0.000798 (0.00132)	-0.000332 (0.00191)
Job control × Entrepreneur without employees	-0.0926 (0.0128)	-0.0748 (0.0183)
Job control × Entrepreneur with employees	-0.0783 (0.0177)	-0.0901 (0.0252)
Job control × Education × Entrepreneur without employees	-0.00903 (0.00654)	0.0304 (0.00875)
Job control × Education × Entrepreneur with employees	-0.0150 (0.00743)	0.0208 (0.0102)
Ability	0.0359 (0.00332)	0.0451 (0.00542)
Ability × Entrepreneur without employees	-0.0327 (0.0124)	-0.0100 (0.0185)
Ability × Entrepreneur with employees	0.0254 (0.0150)	0.0307 (0.0218)
R^2		0.357
Observations	74480	74480

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Table 9 shows the result for stratified analysis of entrepreneurs without and with employees when job control is added to the mix. Our goal is to check whether job control mediates the higher returns to education for entrepreneurs without employees or with employees versus wage workers. We follow the same procedure used in the analysis of Table 7, only this time, we are focused on the random and fixed effect models for Education × Entrepreneur without employees and Education × Entrepreneur with employees. Comparing panel A of Table 9 to Table 8, we see that job control does not reduce the coefficient of the interaction terms for Education × Entrepreneur without employees and Education × Entrepreneur with employees; this suggests that there is no evidence for mediated moderation of job control. Analysing Panel B of Table 9 also yields similar results. Hence, job control fails to act as a mechanism of mediated moderation in explaining the returns to education for entrepreneurs with and without employees versus wage workers. This result is in line with the findings of the (Hessels et al., 2020) study.

EXTENSION RESULTS

Table 10 shows the results of our extension of the (Hessels et al., 2020). Here, we introduce life satisfaction as a potential mechanism of mediate moderation that explains the higher returns to formal education for entrepreneurs compared to employees. We follow the same procedure used in (Hessels et al., 2020) study. We are interested in examining the interaction term Education × Entrepreneur and checking whether there is a reduction in the coefficient observed when we include life satisfaction in the regression models. As before, we look at Table 6 Panel A, where cognitive ability is not included, the interaction coefficient of Education × Entrepreneur without life satisfaction is 2.3 percentage points for entrepreneurs compared to employees in the random-effects model, and the fixed-effects regression model shows a premium of 3.1 percentage points for entrepreneurs. When life satisfaction is added to our model, the interaction term Education × Entrepreneur increases, with the random-effects model showing significantly higher returns to education for entrepreneurs, now at 3.56 percentage points, and the fixed-effects regression indicating a premium of 3.10 percentage points for entrepreneurs. These results fail to show any reduction in the coefficient of interaction term for Education × Entrepreneur(see Table 6), suggesting that our hypothesis 4 is not supported. That is, life satisfaction fails to act as a mediate moderation mechanism to higher returns to education for entrepreneurs compared to wage workers. A similar result is obtained in Panel B for Table 10.

Table 11 also follows a similar empirical strategy to assess whether Job satisfaction plays a mediating mechanism to explain the higher returns to education for entrepreneurs compared to wageworkers. From the table, we can see that in panel A, where cognitive ability is not included, the regression effects model fails to show a reduction in the interaction term, but the fixed effects model shows a slight decrease in the coefficient of the interaction term for Education × Entrepreneur, a premium 2.86 percentage points(compared to coeff. Interaction term panel A, table 6, fe, 3.1 percentage points). However, panel b of Table 11 does not show any reduction in the coefficient of the interaction term. It might be possible to assume that job satisfaction might act as a partial mediating variable under certain circumstances.

Table 10: The relationship between formal education and income (dependent variable: logarithm of annual income); Models including life satisfaction and triple interaction

A. Cognitive ability not included

	All (RE)	All (FE)
Education (demeaned)	0.0767 (0.00177)	0.0846 (0.00185)
Entrepreneur with or without employees	-0.296 (0.00774)	-0.290 (0.0102)
Education × Entrepreneur	0.0356 (0.00523)	0.0310 (0.00603)
Life satisfaction	-0.000295 (0.00221)	0.0163 (0.00309)
Life satisfaction × Education (demeaned)	0.000180 (0.00152)	0.000657 (0.00175)
Life satisfaction × Entrepreneur	0.0658 (0.00623)	0.0508 (0.00833)
Observations	87078	87078
R^2		0.383

B. Cognitive ability included

	All (RE)	All (FE)
Education (demeaned)	0.0751 (0.00183)	0.0833 (0.00197)
Entrepreneur with or without employees	-0.307 (0.00805)	-0.300 (0.0109)
Education × Entrepreneur	0.0407 (0.00544)	0.0343 (0.00651)
Life satisfaction	0.000301 (0.00232)	0.0139 (0.00333)
Life satisfaction × Education (demeaned)	0.000707 (0.00159)	0.00118 (0.00190)
Life satisfaction × Entrepreneur	0.0683 (0.00667)	0.0528 (0.00919)
Life satisfaction × Education × Entrepreneur	0.0121 (0.00465)	0.0110 (0.00564)
Ability	0.0373 (0.00341)	0.0534 (0.00530)
Ability × Entrepreneur	-0.00107 (0.0100)	-0.00231 (0.0143)
Observations	74448	74448
R^2		0.385

Extension Table 11: The relationship between formal education and income (dependent variable: logarithm of annual income); Models including Job satisfaction and triple interaction.

A. Cognitive ability not included

	All (RE)	All (FE)
Education (demeaned)	0.0768 (0.00177)	0.0846 (0.00185)
Entrepreneur with or without employees	-0.307 (0.00778)	-0.300 (0.0102)
Education × Entrepreneur	0.0332 (0.00528)	0.0286 (0.00609)
Job satisfaction	0.00441 (0.00165)	0.0107 (0.00229)
Job satisfaction × Education (demeaned)	0.00119 (0.00116)	0.000657 (0.00175)
Job satisfaction × Entrepreneur	0.0605 (0.00505)	0.0526 (0.00665)
Job satisfaction × Education × Entrepreneur	0.00558 (0.00351)	0.00296 (0.00408)
Observations	87078	87078
R^2		0.384

B. Cognitive ability included

	All (RE)	All (FE)
Education (demeaned)	0.0753 (0.00183)	0.0833 (0.00197)
Entrepreneur with or without employees	-0.318 (0.00811)	-0.310 (0.0110)
Education × Entrepreneur	0.0370 (0.00554)	0.0306 (0.00663)
Job satisfaction (jbmsall)	0.00502 (0.00172)	0.00884 (0.00245)
Job satisfaction × Education (demeaned)	0.00150 (0.00121)	0.000809 (0.00144)
Job satisfaction × Entrepreneur	0.0595 (0.00540)	0.0529 (0.00734)
Job satisfaction × Education × Entrepreneur	0.00739 (0.00382)	0.00811 (0.00460)
Ability	0.0373 (0.00341)	0.0536 (0.00530)
Ability × Entrepreneur	-0.00188 (0.0100)	-0.00252 (0.0142)
Observations	74448	74448
R^2		0.385

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CONCLUSION

The aim of our study was to replicate and extend the findings of Hessels et al. (2020) paper on differential returns to formal education for entrepreneurs and employees in Australia. Using data from the Household Income and Labor Dynamics in Australia (HILDA) Survey from 2005 to 2017, we were able to replicate the original findings of the authors.

Consistent with the original study, our replication findings showed that the returns to formal education are higher for entrepreneurs than for employees. Specifically, each additional year of education increases income by 11.8% for entrepreneurs and 9.04% for employees. The interaction term between education and entrepreneurship showed significantly higher returns for entrepreneurs (2.3 percentage points), confirming Hypothesis 1. In our replication, we also observed that adding job control increased the interaction coefficient rather than reducing it, and hence, we concluded that job control failed to act as a mediating mechanism explaining the higher returns to education for entrepreneurs vs employees thereby we rejected the Hypothesis 2. We also replicated the finding that the differential returns to education are more pronounced among entrepreneurs without employees

In exploring life satisfaction as a potential mediating mechanism to explain higher returns to employees, our results indicated that adding life satisfaction to the model increased the interaction coefficient for Education x Entreprenuer. This suggests that life satisfaction does not mediate the higher returns to education for entrepreneurs, thereby rejecting Hypothesis 3. Similarly, our analysis of job satisfaction showed that it does not significantly reduce the interaction term between education and entrepreneurship. While the fixed-effects model showed a slight decrease, it was not substantial enough to support job satisfaction as a mediating factor, rejecting Hypothesis 4.

Limitations :

Data Limitations: Differences in data cleaning and processing could have influenced our results.

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