PRELIMINARY DRAFT - PLEASE DO NOT CITE OR QUOTE

The formation of expectations: Competing theories and new evidence *

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Abstract

Agents form expectations about the future in many markets, and these expectations drive investment and consumption behavior, inform entry and exit choices, and can even provide direct satisfaction or distress. How agents form expectations is therefore of central interest to economists. This paper reviews several competing theories and then provides empirical evidence about what elements make up an agent's expectation about an outcome that is person-specific, susceptible to influence by the agent's own actions, and fairly well predictable on the basis of historical precedent. We examine repeated cross-sections of hundreds of undergraduate students' expectations at mid-semester of their own final course grades at two Australian universities. Data on actual and expected grades are exploited, as well as demographic and psychological information, socioeconomic information, and data on students' academic background, effort levels, happiness, and historical progress at university prior to expectation formation. Results strongly indicate that a simple neoclassical model of expectations does not fit the data, and that a utility model involving either direct utility benefits from expectations, or a psychological need to hold high expectations, is a better candidate explanation for the empirical facts.

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1 Introduction

Are the expectations of an individual a reasoned reflection of the information available to him, or do expectations, and the choices those expectations lead to, reflect desires irrelevant to the actual outcome?

Conventional economic wisdom, embodied in expected utility theory (Neumann & Morgenstern 1947), holds that expectations are on average correct and that only information about the outcome and the probability of that outcome occurring matter in forming those expectations. However, this does not imply perfect expectations: if agents use only part of the objectively-relevant information in forming their subjective probabilities, then their expectations may be at odds with the guess arrived at by an all-seeing observer. Some random noise, but not systematic bias, may then be present in expectations.

Yet we now know that the idealized notion embedded in expected utility theory about how people arrive at expectations is not quite true. Systematic biases in people's expectations away from the truth have been found empirically, and have also been strongly implied by evidence brought to bear in support of prospect theory and other "non-expected utility" models (see (Starmer 2000) for a review). Both the probabilities of events and the actual outcome possibilities are subject to systematic mis-perceptions. The classic finding of Kahneman & Tversky (1979) in regard to probabilities is that individuals over-estimate small probabilities and under-estimate very large ones, such that perceived probabilities are closer to 50% than are true probabilities (see also (Gigerenzer & Selten 2001)). In terms of perceptions of outcomes, some studies find that individuals find it hard to distinguish between numbers lying far away from their lived experience, even if they are objectively very different (Freudenburg & Rursch 1994). Simply put, a million and a billion dollars sound quite similar to the beggar.

The question we ask in this paper is whether expectations are colored by our emotions, and if they are, what mechanism may lie behind this. The first possibility we are interested in is that individuals might obtain a direct utility benefit from imagining a higher outcome, and therefore would choose to hold higher average expectations than are warranted by reality. This idea has been offered by economists looking at utility streams from income growth (Senik 2008, Clark, Frijters & Shields 2008), and could equally apply to other situations in which individuals form expectations about non-monetary outcomes that are meaningful to them in

a utility sense. One evolutionary rationale for such an 'over-optimism' trait is that this makes individuals more convincing when they promise things to others: because they themselves believe that a good outcome will ensue, they sound more believable to others when they make impossible promises.[1]

Despite the empirical evidence of over-optimism, it is unsatisfying as a theory because it does not provide a precise notion of what one would be overly optimistic about: surely individuals are not overly optimistic about the size of their breakfast, or the distance to their job? The second possibility we therefore investigate is whether individuals' expectations are connected specifically to their self-esteem, where higher self-esteem brings about a direct utility benefit.[2] The evolutionary rationale for this is more precise, in that the signal to potential partners is in terms of abilities. Optimistic expectations are the logical outflow of an inflated estimate of one's own capabilities. This mechanism would imply a narrower set of outcomes about which one is overly optimistic: in particular, we should over-estimate the likelihoods of positive outcomes connected to our own estimation of ourselves, i.e. outcomes that reflect positively on our abilities. Under this model, one would expect individuals to be overly optimistic about their driving abilities and thus under-invest in car insurance, while not expecting much systematic bias in, say, the distance they must drive to work or how happy they will be in five years. (Consistent with this, Frijters, Greenwell, Haisken-DeNew & Shields (2009) indeed find no systematic bias in the degree to which German respondents in a large panel thought they would be happy in the future).

In this paper, we formulate simple models about expectation formation reflecting the three possibilities discussed above. While our models are new, the basic ideas incorporated in them are not. In particular, Brunnermeier & Parker (2004) constructs a model where

[1]Social psychology offers that self-deception about one's own abilities is useful inasmuch as truly believing that one is terrific helps in convincing potential mates, who have evolved to be good at reading other people's true feelings, that one is in fact terrific (Trivers 2000); see Byrne & Kurland (2001) for a formal evolutionary model of this idea.

[2]This is similar to the mechanism proposed in Gottlieb (2009) in the sense of implying an optimal self-deception. However, in Gottlieb's framework, selective memory is also in play and, crucially, people with sufficient practice learn to stop deluding themselves and devolve to satisfying the predictions of expected utility theory. An alternative rationale for a connection between expectations and self-esteem is that high self-esteem might be directly related to our mental health and hence our outlook: optimists are, on average, psychologically healthier than pessimists (Scheier & Carver 1992).

expectations of the future directly bring pleasure, and uses it to show among other things that optimally, people will choose to hold expectations that are higher than reality; and Gottlieb (2009) embeds a value of high self-image into a utility model. These two papers are entirely theoretical, and neither do they directly test the theory they propose against alternatives, nor do they provide arguments for why high expectations themselves (in the case of the first paper) or positive self-image (in the case of the second paper) are valued. [3]

We confront the different predictions from our three simple models with rich data including grade expectations amongst undergraduates to determine what underlying utility structure best explains expectation formation about an outcome that is person-specific, susceptible to influence by the agent's own actions, and fairly well predictable on the basis of historical precedent. Demographic, psychological, and socioeconomic data, information about prior performance at university, effort, and happiness measures are all used to explore the drivers of students' expectations about their performance in university courses. Results strongly support a direct utility contribution from high expectations and provide mild support for the conclusion that holding high expectations is itself a mere by-product of the need for self-esteem.

2 Competing theories explaining expectation formation

In this section, three utility formulations are used to generate different predictions about the empirical relationships between expectations and aspects of the person forming those expectations. Each model assumes an agent who derives utility from an educational outcome (his percentage grade in a university course, also termed a 'mark') that is produced via both fixed traits of the individual, such as ability, and variable inputs, which we call effort.

2.1 Neoclassical model

We begin with a simple neoclassical utility framework. There are two periods, where Self0 in period 0 reports the expected grade and decides on effort. Utility is only experienced in period 1, and equals

[3] Indeed, (Gottlieb 2009) correctly states (page 5) that "This paper abstracts from the exact reason why people may value a positive self-image."

$$
\begin{aligned}
U_i(a,e) &= f(e,a) - c(e) + v \\
f'_e &> 0, f''_e < 0, \frac{d^2 f}{deda} > 0 \\
c'(e) &> 0, c'' \geq 0 \\
a &= \textbf{ability} \\
e &= \textbf{effort} \\
f + v &= \textbf{outcome}(\textbf{grade}) \\
f &= \textbf{mathematicallyexpectedoutcome}(\textbf{grade})
\end{aligned}
$$

$f^*(e,a)$ should be understood as capturing all the factors affecting the outcome that are observable by the individual and that are partly under his control. The individual wants to obtain a high grade, but at minimal effort, given his ability. He chooses a level of effort to expend based on an objective view of his costs and benefits. The individual's optimal choice in this framework is to set $c' = f'$, which due to the positive cross-derivative implies that more able individuals will choose higher levels of effort. Outcomes will then also be higher for those with higher effort and for those with higher ability.

To the neo-classical economist, the mathematically expected outcome, as it is the truth, is also the optimal belief for the individual to hold. However, there may well be information that is not part of the observation space of the individual but that nonetheless influences the outcome. This implies that there may be a random prediction error, call it v, which is not part of expected utility. In the neoclassical model, not only should it be true that v has a mathematical expectation of zero, but there should also be nothing observable about an individual that is predictive of v: there should be no 'unused' information. Thus, the econometrician might measure

$$f^{belief} = f^{true}(e,a) + v$$

but there is no utility-based behavioral reason for any systematic upward or downward bias in expectations, so on average, expectations (f^{belief}) should match the truth (f).

2.2 Joy from high expectations

We next consider a second case where good expectations about the future outcome provide direct utility benefits. Here, the agent lives for 3 periods. At time 0, the individual experiences no utility but maximizes the sum of the utility at time 1 and 2. The utilities at time 1 and 2 are given as follows:

$$\begin{aligned}
U_{i0} &= U_{i1} + U_{i2} \\
U_{i1} &= \alpha E\{f^*\} \\
U_{i2} &= f^*(e,a) - c(e) - \beta(f^* - E\{f^*\})^2 + v \\
f_e^{*\prime} &> 0, f_e^{*\prime\prime} < 0, \frac{d^2 f^*}{deda} > 0 \\
c_e' &> 0, c_e'' \geq 0 \\
a &= \textbf{ability} \\
e &= \textbf{effort} \\
E\{f^*\} &= \textbf{expectedoutcome} \\
\beta(f^* - E\{f^*\})^2 &= \textbf{regretcostofhavingwrongexpectations} \\
f^* + v &= \textbf{outcome}(\textbf{grade})
\end{aligned}$$

As before, the individual wishes to obtain a high grade but at minimal effort, given his ability. However, the expected grade is now a decision variable itself, with a direct psychic payoff. α can be interpreted as the utility of contemplating good future events ('savoring the future'), while β denotes the dis-utility of regretting having been wrong in one's prediction of a good outcome.

Decisions about expectations are made in period 0 on the basis of maximizing the expected U_{i0} before the outcome materializes, i.e. by a Self0 who is purely rational. The optimal choice by this Self0 is to set $E\{f) = f + \frac{\alpha}{2\beta}$ which means there is a direct and constant level of over-optimism equal to $\frac{\alpha}{2\beta}$. If the econometrician had measures of either α or β at the individual level, then the implications of this theory could be directly tested by relating these parameters to expectations.

Regarding effort choice, an individual sets his optimal level of effort to satisfy $c_e' = f'(1+\alpha)$ which again means that more able individuals will choose higher levels of effort. The degree

to which an individual savors the future should also directly affect effort, since a higher utility from savoring the future increases the incentive to have higher grades.

The distinction made here between the Self0 who makes the decisions about expectations and effort, and the other selves who experience the savoring and the outcome realization, captures the notion of self-deception. Self0 knows perfectly well what the true expected grade is, and bases chosen effort on that truth (implying that there are no systematic mistakes in behavior), but Self0 treats stated expectations as a consumption good that has no behavioral consequences. This framework therefore leads to the joint predictions that there will be over-optimism, and that both ability and the degree of future savoring affect effort.

2.3 High expectations as a reflection of self-esteem

We finally consider a third case where expectations themselves are based on the true model of how the world works, but where inflated estimates of own ability distort those expectations. There are now two periods, with a Self0 who is only interested in the utility experienced by Self1:

$$\begin{aligned}
U_{i0} &= U_{i1} = U_i(a^*, e) = f^*(e, a) - c(e) + \gamma a^* + v \\
f_e^{*\prime} &> 0, f_e^{*\prime\prime} < 0, \frac{d^2 f^*}{deda} > 0 \\
c_e' &> 0, c_e'' \geq 0 \\
a &= \textbf{ability} \\
a^* &= \textbf{self} - \textbf{esteem} = \text{own perception of ability} \\
e &= \textbf{effort} \\
f^*(e, a^*) &= \textbf{statedexpectedoutcome} \\
f^* + v &= \textbf{outcome}(\textbf{grade})
\end{aligned}$$

As before, the individual wishes to obtain a high grade, but now he also gets a direct utility benefit from self-esteem, understood as his perception of his own ability. Expectations of grades are then formed based on the actual model of the world (i.e. the correct $f^*(.)$) but using the inflated measure of self-esteem (i.e., a^* rather than a). In this case, expectations are not a choice variable, but a^* is. The timing of decisions in this framework is that a

super-rational Self0 chooses self-esteem, while Self1 then chooses effort and experiences the outcome.

One might at first glance think that self0 should choose to have infinite self-esteem, but this is not the case. There will be a cost to high self-esteem, in the form of the inflated effort level that appears to be optimal when self-esteem is held higher, and this trade-off between the utility of higher self-esteem and the dis-utility of higher effort allows for a finite solution for self-esteem.[4]

The optimal choice by Self1, conditional on Self0's choice of self-esteem a^*, is to set $c'_e = f'^*(e, a^*)$. Backing up one step, Self0 must then solve

$$\max_{a^*} E[U_i(a^*, e)] = f^*(e^*, a) - c(e^*) + \gamma a^*$$

where e^* is given as the solution to $c'_{e^*} = f'^*(e^*, a^*)$. The solution to this problem yields

$$\frac{de^*}{da^*} f'^*(e^*, a^*) - c'(e^*) + \gamma = 0$$

From the implicit function theorem, we can write $\frac{de^*}{da^*} = \frac{\frac{\delta^2 f^*}{\delta e \delta a}}{c''_e - f''^*_e} > 0$. There is then a unique solution for optimal effort e^* if there is a single crossing-point where the condition above holds. A sufficient condition to ensure this requirement is met is that $\frac{\frac{\delta^2 f^*}{\delta e \delta a}}{c''_e - f''^*_e}$ is a constant.

What is testable about this model is that perceived ability itself should directly relate to utility (even conditional on the expected outcome) and should be higher than actual ability. Also, effort should now be affected by perceived ability as well as by actual ability.

This model is in line with the evolutionary rationale for over-optimism noted above: over-optimism may be not an end in itself (as under the joy-from-expectations model), but a means through which others' behavior can be better influenced. If we believe in ourselves, then we can better convince others that we are of high ability, and part of the reason for this increased verisimilitude is that we *behave* more like a high-ability person: our effort level is higher. This is close in spirit to the argument proposed in (Benabou & Tirole 2006), where individuals believe in the afterlife as a means of pre-committing to better behavior than they would

[4]While this mechanism preventing individuals from choosing to have an infinite self-esteem is somewhat weak, other mechanisms that might constrain self-esteem are easy to imagine. These may include some disutility from holding expectations that are too far away from the truth, as in the joy-from-expectations model.

without that belief.

As a final note, the point of these three models is not that they form three completely alternative explanations of expectations, but rather that each reflects a different mechanism for how expectations are formed. The latter two models in particular do not disallow one another: it is quite possible for reality to reflect elements of both models, where utility hits from expectations and inflated self-image both exist.

3 Data and methodology

This paper exploits a new panel data set on Australian students enrolled in undergraduate programs within the business faculties of two universities in the Australian Technology Network of universities: the University of South Australia, in Adelaide, and the University of Technology Sydney. Administrative data are available at the student-tutorial level for the universe of students enrolled and taking courses in these programs at any point during the autumn and spring semesters of 2008, 2009, or 2010. Information from the enrolment systems of each institution was merged with data from students' applications to university, resulting in an administrative data set that includes demographics (such as age, international student and non-English-speaking status, country of birth, and gender) as well as detailed information about which courses and tutorials each student was enrolled in during each covered semester, and what grades were achieved in each.

For the purposes of the present paper, these administrative data were merged with information collected via surveys administered twice per year on the same undergraduate population over the same time period. This information includes, amongst other items, self-rated ability overall and with respect to mathematical and verbal skills; two items capturing self-rated effort (overall and in tutorials); and questions about expected grades (0 to 100) in each course that was currently being undertaken by the student. A battery of psychological and socioeconomic data were also collected periodically in these surveys, some of which is used in the present paper.[5] Survey data were collected in two-to-three week intervals falling roughly in the middle of an academic semester in 2008 or 2009.

[5]Some items and item sets were repeated across all surveys, and others appeared in only a subset of surveys. Details are available in the Appendix.

The final analysis data set provides actual and expected grades for all courses in a semester for that subset of students in the administrative data who responded to the survey in that semester with useable answers. Approximately 67% of the full student-tutorial level sample used in this paper is generated from students who responded to only one survey, and the balance is from students who responded to two (25%), three (6%), or four (1%) surveys.

Summary statistics on several variables are presented in Table 1. The first three columns show statistics for the full sample, using all useable data on each variable, and the second three columns show the same statistics calculated across all observations with non-missing data on all variables ever used in this paper (that is, the most restricted analysis sample constructed). Statistics are very similar across these two samples.

Importantly, information about expectations was elicited roughly midway through the semester. This timing was intended to capture a point in time when some private information would be available to the student, on the basis of which he could form beliefs and/or take action, yet not so close to the end of the semester that there was no chance of changing the outcome through his own effort.

Further information about the surveys and the questions used is provided in the Appendix.

Table 1: Summary statistics

	Full Sample			Most Restricted Sample		
	Mean	Std Dev	N	Mean	Std Dev	N
Average mark	65.48	(13.10)	4715	67.03	(12.75)	418
Average expected mark	71.89	(9.62)	4715	71.32	(9.57)	418
Self-assessed verbal ability	9.34	(2.04)	2926	9.87	(1.56)	418
Self-assessed math ability	7.64	(2.36)	2925	7.61	(2.57)	418
Self-assessed relative ability	2.21	(0.60)	4708	2.31	(0.61)	418
Self-assessed relative effort	2.03	(0.71)	4706	1.99	(0.76)	418
Female	0.63	(–)	4709	0.57	(–)	418
Age	21.95	(4.59)	4709	21.85	(4.79)	418

Note: Statistics are calculated across student-tutorial level observations.

4 Results

Table 1 indicates that on average, students' expectations of their grades exceed what their grades in fact turn out to be. The observation-level difference in actual and expected marks is 6.41 percentage points. This difference is approximately normally distributed across the population of students. Figure 1 shows a scatterplot of actual versus expected marks using all available data, where each dot is a student-tutorial combination. Figure 2 shows the same information in overlaid histograms. Finally, Figure 3 shows a histogram of the difference between expected and actual grades, clearly centering above zero. We conclude that there is little *a priori* evidence in support of the neoclassical utility formulation, where people on average guess correctly about the future.

To test this first model further, we use simple OLS to predict the difference between expected and actual grades based on a raft of individual and context-specific controls. If there is indeed no systematic bias in expectations away from reality such that errors in expectations are random on average, then not only should the constant in this model be close to zero, but the predictive power of individual characteristics in explaining any deviation of expectations from reality should be very small. In these models, we include multiple proxies for student ability; student effort; course level fixed effects; and general effects for each of seven disciplinary groupings. Standard demographics (age, gender, and international student status) are also controlled.

Our results are presented in Table 2. The table clearly demonstrates both a persistent upward bias in expectations on average and a highly statistically significant dependence of an individual's bias on his personal characteristics. We take this as preliminary evidence that individual psychology is involved in the formation of expectations.

Finally, in Table 3 we show the results of predicting grade expectations themselves based on this suite of covariates. In these regressions we also include the actual mark variable—the later-revealed true outcome about which expectations were formed—in most columns. The strong statistical dependence os expectations upon personal characteristics remains. Using all of the information we have, in Column 4, we are able to explain approximately 27% of the variation in expected grades.

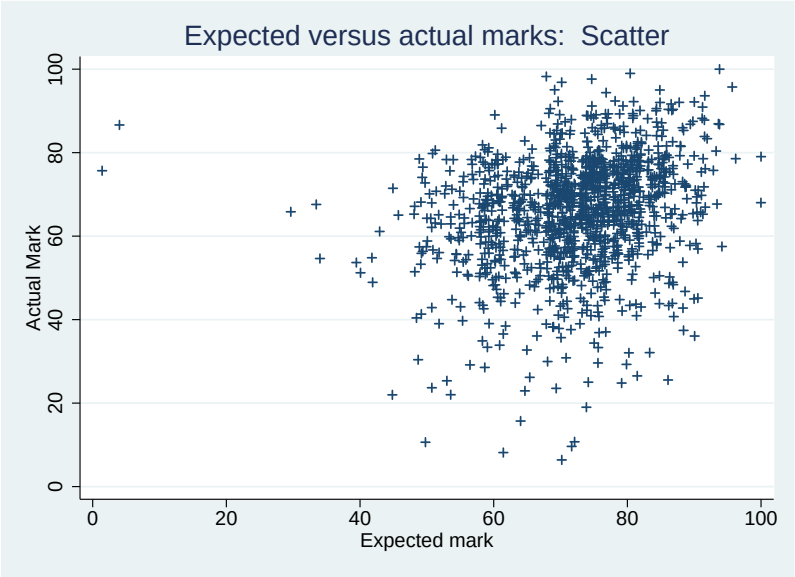

Figure 1: Scattergram

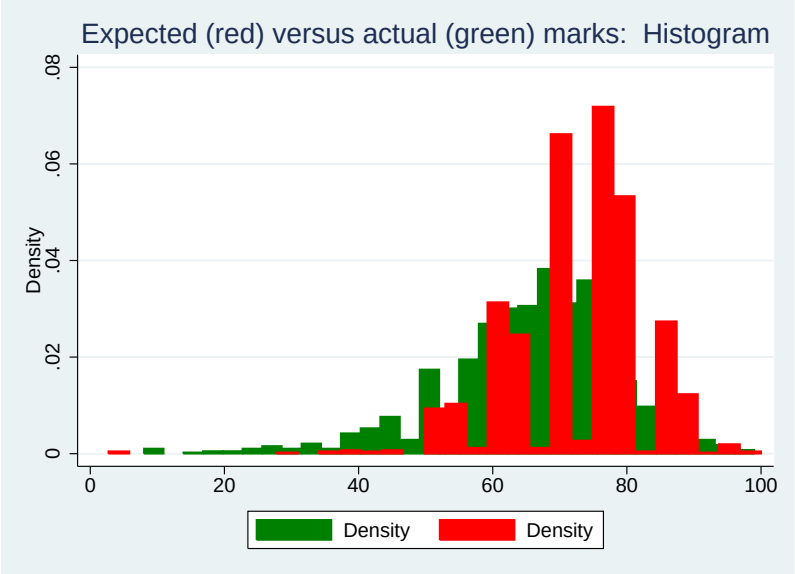

Figure 2: Histogram

Table 2: Predicting the difference between expected grade and actual grade

	(1)	(2)	(3)
selfalf2		4.949***	4.798***
		(1.12)	(1.27)
selfalf3		4.375***	3.621**
		(1.23)	(1.40)
verbal		0.599**	0.708**
		(0.20)	(0.23)
math		0.330*	0.418**
		(0.14)	(0.16)
selfeffort2		-0.340	-0.242
		(0.71)	(0.82)
selfeffort3		0.282	0.261
		(0.86)	(0.99)
female		-2.355***	-2.787***
		(0.62)	(0.71)
age		0.192**	0.140
		(0.07)	(0.08)
n_coursesmarked		-0.851*	-0.901*
		(0.39)	(0.45)
newstudent		0.801	3.855
		(2.62)	(2.90)
intl		3.774**	3.359*
		(1.15)	(1.32)
no_eng		2.228*	3.459**
		(0.91)	(1.13)
noaus		-0.195	0.506
		(1.04)	(1.28)
lastgpa		-0.382***	-0.353***
		(0.03)	(0.03)
SBI_anticipate			0.576**
			(0.21)
_cons	46.620*	30.273*	16.747
	(19.76)	(15.23)	(16.05)
AdjR-sq	0.059	0.212	0.227
Obs	4651	1928	1497

Institution effects, course fixed effects, and discipline-specific effects are controlled. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

4.1 Joy from expectations

Is there evidence that those who benefit more from holding high expectations, in a utility sense, in fact have higher expectations? To investigate this, we first use a shortened form of the item set constituting the 'anticipatory savoring' measure taken from Bryant & Veroff (2007), which is reproduced in the Appendix. This measure is designed such that the higher an individual scores, the more direct pleasure he obtains from contemplating good future events (that is, how much he directly enjoys high expectations about the future). This variable is therefore a proxy for α in our 'joy from expectations' model above.

We include anticipatory savoring, labeled "SBI_anticipate", in Columns 2, 3, and 5 of our OLS models of expectations in Table 3. Strikingly, even when many other individual and contextual variables are controlled, this variable retains an economically important and significant impact on expectations. Moreover, individual heterogeneity in savoring is not well-correlated with other aspects of the individual: the point estimate on the SBI_anticipate variable changes very little going from one column to the next.

As a second check on whether a direct link from expectations to utility impacts individuals' choice of what expectations to hold, we use responses to Question 46 from the first student survey that reads, "I prefer to have low expectations of the future since that way I might be pleasantly surprised, and I'm protected from being disappointed" and is answered on a 1 to 11 scale. We code this item so that higher numbers indicate a preference for higher expectations, and then include it (labeled "q46_08_1") in the prediction of expectations in Column 6 of Table 3. This variable's estimated coefficient is large, positive, and statistically significant, even including our controls for ability, effort, and student demographics.[6] This supports our contention that in part, the existence of expectations that exceed reality is due to direct utility flowing from expectations: expectations are set higher by people who obtain more pleasure from contemplating good future events than from being disappointed.

The second prediction of our model of direct utility benefits from expectations is that aspects of the individual governing how much utility he obtains from expectations should independently affect effort, even when ability is controlled. To test this second prediction, we use the future-savoring variable explained above to predict own effort, holding constant ability

[6]Some controls do not appear in this column as they were not available for students answering the first survey.

Table 3: Predicting expectations

	(1)	(2)	(3)	(4)	(5)	(6)
SBI_anticipate		0.589***	0.517***		0.483***	
		(0.12)	(0.11)		(0.15)	
q46_08_1						0.448***
						(0.08)
mark			0.226***	0.200***	0.207***	0.163***
			(0.01)	(0.02)	(0.02)	(0.02)
selfalf2				5.568***	5.428***	3.599***
				(0.78)	(0.89)	(0.85)
selfalf3				7.290***	7.038***	5.856***
				(0.86)	(0.99)	(0.94)
verbal				0.181	0.272	
				(0.14)	(0.16)	
math				0.468***	0.376***	
				(0.10)	(0.11)	
selfeffort2				1.473**	1.302*	2.169***
				(0.50)	(0.58)	(0.61)
selfeffort3				2.968***	3.037***	3.114***
				(0.60)	(0.70)	(0.71)
female				-0.409	-0.827	-0.446
				(0.43)	(0.50)	(0.53)
age				0.142**	0.115*	0.155*
				(0.05)	(0.06)	(0.07)
n_coursesmarked				-0.363	-0.450	0.333
				(0.27)	(0.31)	(0.32)
newstudent				-0.477	1.107	
				(1.82)	(2.04)	
intl				2.029*	2.296*	-1.006
				(0.80)	(0.93)	(0.91)
no_eng				1.569*	2.395**	2.927***
				(0.63)	(0.79)	(0.67)
noaus				-0.651	-0.912	-0.035
				(0.72)	(0.90)	(0.78)
lastgpa				-0.006	-0.021	
				(0.02)	(0.02)	
_cons	68.497***	78.712***	64.437***	50.427***	50.701***	45.016***
	(13.67)	(11.17)	(10.66)	(10.60)	(11.31)	(2.79)
AdjR-sq	0.080	0.093	0.180	0.277	0.276	0.158
Obs	4651	2399	2399	1928	1497	1465

Institution effects, course fixed effects, and discipline-specific effects are controlled. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

and other characteristics of the student and the context. Table 4 shows estimated marginal effects of our key variables on the latent probability of a respondent reporting himself to be in the combined highest-or-second-highest effort category, taken from an MLE-estimated ordered logit model predicting the respondent's ranking of how hard he works.

In Columns 1 through 3 of Table 4 we show the results of including only student and context-specific variables, excluding our proxy for the utility parameter. These columns show a strong dependence of effort on ability, as would be predicted by any of our three utility formulations. In Column 4 of Table 4, we then add the future-savoring variable to the effort-prediction equation. Confirming the prediction of the joy-from-expectations model, savoring the future is predicted to have a strong positive effect on effort. This effect remains once we control for additional controls about the individual in Column 6.

We conclude that the model under which people obtain joy from high expectations is fairly well-supported by our data.

4.2 Expectations and the need for self-esteem

Turning to our third model, where the explanation for inflated expectations is an inflated perception of one's own ability, we first note that one prediction from this model is that effort should be affected not only by true ability but by perceived ability, i.e., self-esteem. Taking prior-semester GPA as a proxy for true ability, we see in Table 4 that even controlling for this, our measures of self-perceived ability are highly significant in predicting own effort. To test more directly whether this is truly reflective of a self-esteem effect rather than an influence of other aspects of true ability captured through the self-perceived ability measures, we re-run these models using the Rosenberg self-esteem measure (Rosenberg 1965), whose ten items (shown in the Appendix) were asked in two of our surveys, in place of self-perceived ability. Table 5 shows that the basic result persists: self-esteem is strongly and positively related to effort.

The second major prediction from the self-esteem model is that perceived ability—interpreted as self-esteem in this framework—should directly relate to utility. To test this prediction, we use answers to two survey questions that relate to satisfaction. The first question, included in surveys 2 and 3, asks the respondent to indicate the extent to which he agrees or disagrees (on a 1-to-11 scale) with the following statement: "Overall, I'm doing better than those I

Table 4: Marginal effects on the latent probability of self-rating as the highest-effort type

	(1)	(2)	(3)	(4)	(5)	(6)
SBI_anticipate				0.140***		0.145***
				(0.03)		(0.03)
lastgpa	0.048***		0.043***	0.046***	0.041***	0.043***
	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)
selfalf2		0.711***	0.538**	0.441*	0.524**	0.407*
		(0.13)	(0.17)	(0.19)	(0.17)	(0.19)
selfalf3		1.740***	1.521***	1.399***	1.510***	1.385***
		(0.15)	(0.18)	(0.21)	(0.19)	(0.21)
verbal		-0.075***	-0.068**	-0.089**	0.001	-0.033
		(0.02)	(0.03)	(0.03)	(0.03)	(0.03)
math		-0.031*	-0.049*	-0.036	-0.038	-0.024
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
female					0.380***	0.493***
					(0.09)	(0.11)
age					0.048***	0.063***
					(0.01)	(0.01)
n_coursesmarked					-0.004	0.071
					(0.06)	(0.07)
newstudent					1.136**	0.994*
					(0.39)	(0.42)
intl					0.365*	0.427*
					(0.18)	(0.20)
no_eng					-0.295*	-0.031
					(0.14)	(0.17)
noaus					0.416**	-0.001
					(0.16)	(0.20)
cut1						
_cons	2.324***	-0.830***	1.896***	2.851***	3.813***	5.387***
	(0.30)	(0.25)	(0.40)	(0.51)	(0.59)	(0.73)
cut2						
_cons	4.506***	1.415***	4.118***	5.176***	6.097***	7.783***
	(0.31)	(0.25)	(0.41)	(0.52)	(0.60)	(0.75)
Obs	2207	2912	1958	1527	1958	1527

Results displayed are marginal effects calculated from coefficient estimates obtained by fitting an ordered logit model to the three-valued data on own effort using maximum likelihood. Institution effects are controlled. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

Table 5: Marginal effects on the latent probability of self-rating as the highest-effort type (2)

	(1)	(2)	(3)	(4)
lastgpa	0.048***		0.052***	0.051***
	(0.00)		(0.00)	(0.00)
self_esteem		0.281***	0.298***	0.334***
		(0.02)	(0.03)	(0.03)
female				0.527***
				(0.11)
age				0.061***
				(0.01)
n_coursesmarked				0.101
				(0.07)
newstudent				0.682
				(0.42)
intl				0.476*
				(0.19)
no_eng				-0.048
				(0.17)
noaus				0.172
				(0.20)
cut1				
_cons	2.324***	1.246***	4.640***	6.989***
	(0.30)	(0.24)	(0.43)	(0.61)
cut2				
_cons	4.506***	3.518***	6.980***	9.420***
	(0.31)	(0.25)	(0.45)	(0.64)
Obs	2207	2436	1534	1534

Results displayed are marginal effects calculated from coefficient estimates obtained by fitting an ordered logit model to the three-valued data on own effort using maximum likelihood. Institution effects are controlled. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

regularly compare myself to." Because responses on this item may partly capture self-esteem rather than purely general life satisfaction, we also use responses to a second question which nonetheless only appears on one survey. The second question, included in only the second survey, asks the respondent to indicate on a 1-to-11 scale the extent to which he agrees or disagrees with the following statement: "Overall, I am very happy." We predict answers to these questions, where higher scores indicate more happiness, and results are shown in Table 6.

All columns of the first panel of Table 6 strongly indicate that self-rating as higher ability is associated with a significant boost to satisfaction. This is true even controlling for actual ability (as proxied by average GPA from the current and prior semesters), our array of demographic measures, average expectations about marks, and effort. Notably, in further support of our model of joy from expectations, expectations themselves have a strong and significant positive association with satisfaction. However, in Panel B of Table 6, using our alternative and more direct measure of happiness (but a smaller sample), we see a weaker association of self-rated ability with happiness in terms of both point estimates and statistical significance once true historical performance is controlled. However, expected marks still retain their strong impact on happiness in this panel.

We conclude that there is further evidence that expectations themselves are directly associated with utility, and mild evidence that a high belief about one's own ability is also associated with higher happiness. While our findings in regard to the impact of self-esteem on happiness are consistent with our model of self-esteem, they could also be consistent with other stories, such as a simple dependence of utility upon relative standing in a comparison group (see (Clark et al. 2008) for additional discussion).

5 Discussion

We write down three competing models of utility, each of which provides empirical predictions about the relationship of expectations and aspects of the expecting agent. We provide strong evidence, using rich new data on undergraduates' grades and expectations, that direct utility benefits from high expectations partly explain high expectations. We also find some evidence pointing to the possibility that inflated self-image may account for expecta-

Table 6: Predicting self-perceived success and happiness

	(1)	(2)	(3)	(4)	(5)
Panel A: Dep. var. = "I'm doing better than those I regularly compare myself to"					
selfalf2	1.116***	1.058***	1.145***	1.022***	1.018***
	(0.16)	(0.16)	(0.22)	(0.22)	(0.22)
selfalf3	1.880***	1.609***	1.500***	1.266***	1.279***
	(0.18)	(0.18)	(0.24)	(0.24)	(0.24)
verbal	0.062**	0.152***	0.044	0.041	0.037
	(0.02)	(0.03)	(0.04)	(0.04)	(0.04)
math	0.085***	0.070***	0.117***	0.091***	0.091***
	(0.02)	(0.02)	(0.03)	(0.03)	(0.03)
selfeffort2		0.843***	0.872***	0.782***	0.784***
		(0.12)	(0.15)	(0.15)	(0.15)
selfeffort3		1.125***	1.007***	0.853***	0.861***
		(0.13)	(0.17)	(0.18)	(0.18)
lastgpa			0.014**	0.011*	0.014*
			(0.01)	(0.01)	(0.01)
e_mark_avg				0.044***	0.046***
				(0.01)	(0.01)
avgmark					-0.006
					(0.01)
_cons	4.075***	4.976***	4.770***	2.449**	2.547**
	(0.33)	(0.57)	(0.80)	(0.94)	(0.95)
AdjR-sq	0.103	0.181	0.181	0.200	0.199
Obs	1728	1718	929	929	929
Panel B: Dep. var. = "Overall, I am very happy."					
selfalf2	2.080***	1.750***	1.291**	0.709	0.739
	(0.37)	(0.38)	(0.39)	(0.38)	(0.38)
selfalf3	2.163***	1.697***	1.254**	0.418	0.455
	(0.40)	(0.42)	(0.44)	(0.43)	(0.43)
verbal	0.067	0.042	0.049	0.093	0.086
	(0.06)	(0.07)	(0.08)	(0.08)	(0.08)
math	0.063	0.100*	0.049	-0.031	-0.034
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
selfeffort2		0.541*	0.572*	0.412	0.389
		(0.24)	(0.24)	(0.23)	(0.23)
selfeffort3		0.108	-0.147	-0.502	-0.530
		(0.28)	(0.29)	(0.28)	(0.28)
lastgpa			0.055***	0.034**	0.021
			(0.01)	(0.01)	(0.01)
e_mark_avg				0.103***	0.101***
				(0.01)	(0.01)
avgmark					0.019
					(0.01)
_cons	3.879***	2.839*	-0.075	-4.491**	-4.695**
	(0.74)	(1.19)	(1.47)	(1.51)	(1.51)
AdjR-sq	0.097	0.137	0.178	0.272	0.275
Obs	467	467	418	418	418

Institution effects are controlled in both panels, as are effects of gender, age, courseload, and being a new, international, non-English-language speaking, or non-Australian born student. $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

tions that exceed reality, although our findings in this regard could also be consistent with a model of reference-dependent utility. A secondary finding is that effort levels are in part determined by individuals' utility parameters, such that if people did not experience pleasure from expectations, effort (and hence performance) would be reduced.

A Data appendix: Surveys

In this paper we use data drawn from five surveys of Australian undergraduates. The population from which our survey data are drawn is the universe of students enrolled internally in 2008 or 2009 in undergraduate programs in the business faculties of two Australian universities: the University of South Australia (UniSA) in Adelaide, and the University of Technology Sydney (UTS). Four online surveys were administered: the first occurred in April to May of 2008; the second in September to October 2008; the third in April to May 2009; and the fourth in September to October 2009. The fifth survey, referred to as the 'supplemental survey', was conducted in paper-and-pencil format in late August 2008. These dates correspond roughly to the middle of the first and second academic semesters in 2008 and 2009. Due to ethics protocols, I could not offer a particularly strong incentive for students to complete the surveys: respondents' names were included in a random draw for $200 (for the first online survey) and $500 (for subsequent online surveys). The response rates for the online survey are between 5 and 10 percent of the surveyed population of approximately 10,000 students at the two institutions combined.

The paper-and-pencil survey was implemented in the week 6 lectures of seven business-division courses at the University of South Australia in semester 2 of 2008, and hence captured effort information specific to the particular tutorial being examined. Of students who attended class, very few refused the survey.

The questions used in this paper to measure self-assessed effort levels and ability were as follows; the survey number (S1, S2, S3, or S4) and/or 'Supp' is written after each question when it appeared in that survey.

Student responses to the following questions, while on a 1-to-4 raw scale, were recoded to a 1-to-3 scale due to shallow numbers of '4' responses. On the recoded scale, step 1 is 'not as . . . ', step 2 'about as . . . ', and step 3 'more' or 'much more . . . '.

Q5: "Overall, with respect to academic work, would you rate yourself as ... (choose one) [S1, S2, S3, S4, Supp]

- Not as capable as other [UTS/UniSA] students
- About as capable as other [UTS/UniSA] students
- More capable than other [UTS/UniSA] students
- Much more capable than other [UTS/UniSA] students

Q6: "Overall, with respect to academic work, would you rate yourself as ... (choose one) [S1, S2, S3, S4, Supp]

- Not as hardworking as other [UTS/UniSA] students
- About as hardworking as other [UTS/UniSA] students
- More hardworking than other [UTS/UniSA] students
- Much more hardworking than other [UTS/UniSA] students

The following questions were answered on an agree-disagree scale of 1 to 11.

"My overall fluency in English—speaking, writing, reading, and understanding—is excellent. [S2, S3, S4]

"My overall fluency with mathematics, statistics, and numbers generally—interpretations, manipulations, and illustrations of them—is excellent. [S2, S3, S4]

Responses to the following four items are averaged to measure savoring of the future, following (Bryant & Veroff 2007) who propose an expanded set of items to measure future savoring, including these four.

"I feel a joy of anticipation when I think about upcoming good things. [S3, S4]

"It's hard for me to get very excited about fun times before they actually take place. [S3, S4; reverse-coded]

"I can make myself feel good by imagining what a happy time that is about to happen will be like. [S3, S4]

"When I think about a pleasant event before it happens, I often start to feel uneasy or uncomfortable. [S3, S4; reverse-coded]

Responses to the following ten items are averaged to measure self-esteem, following (Rosenberg 1965).

"On the whole, I am satisfied with myself. [S3, S4]

"At times I think I am no good at all. [S3, S4; reverse-coded]

"I feel that I have a number of good qualities. [S3, S4]

"I am able to do things as well as most people. [S3, S4]

"I feel I do not have much to be proud of. [S3, S4; reverse-coded]

"I certainly feel useless at times. [S3, S4; reverse-coded]

"I feel that I am a person of worth, or at least on an equal plane with others. [S3, S4]

"I wish I could have more respect for myself. [S3, S4; reverse-coded]

"All in all, I am inclined to feel that I am a failure. [S3, S4; reverse-coded]

"I take a positive attitude toward myself. [S3, S4]

Finally, in every survey, students were asked about their likely academic outcome in each course in which they were enrolled that semester, using the following survey item:

> Q7: "Please list the courses you are enroled in at UniSA/UTS and the final course marks (percentages out of 100) that you expect in each. PLEASE SEPARATE COURSES WITH SEMICOLONS—For example: Business Statistics 80; Microeconomics 70; Financial Accounting 75.

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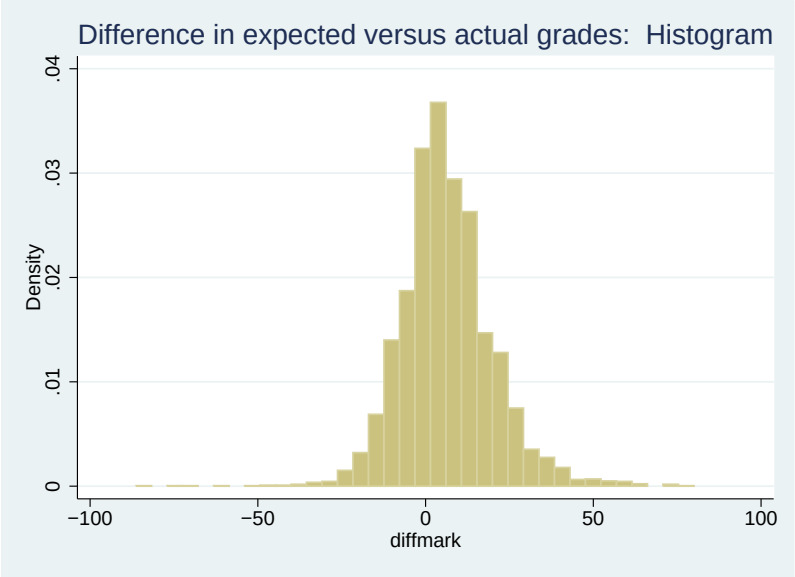

Figure 3: Histogram