"PROSPECT THEORY AND ASSET PRICES" (Authors: N. Barberis, M. Huang, T. Santos)

The point of this note is to explain the ideas in the above research paper without using any mathematics or technical jargon (the original paper contains both). The intended reader is someone who is interested in economics and finance but who is not an academic researcher. I welcome your comments on the ideas below, whether you agree with them or not; and also on the write-up itself -- for example, please let me know if it is confusing, so that I can rework it.[1]

I'll start with a short summary, and will then give the longer version.

SHORT SUMMARY

We propose that people think about stock market risk in the following way: (i) they feel good when the stock market goes up; (ii) they feel bad when the stock market goes down; (iii) they are more sensitive to stock market drops than to stock market increases; and (iv) how sensitive they are to a drop in the stock market depends on their prior gains or losses. We show that this framework can help us make sense of a number of puzzling facts about the stock market.

LONGER SUMMARY

In this paper, Ming Huang, Tano Santos, and I try to make some progress on understanding the behavior of the U.S. stock market. Even after years of study, there are still many basic things about the stock market that researchers find puzzling. For example, we don't understand why the U.S. stock market performed so well over the past century; nor do we understand why it fluctuated so much from year to year. (More on both of these puzzles later).

Huang, Santos, and I argue that the reason that earlier academic models had trouble explaining the behavior of the stock market is because they didn't do a good job describing how investors think about risk. In this paper, we propose a new model that, we hope, does a better job on this front. Specifically, we posit that investors react to risk in the following way: When the stock market goes up, they feel good. When the stock market goes down, they feel bad. Moreover, they are more sensitive to losses than to gains, so that, while they feel good when the stock market goes up, they feel *really* bad if it goes down.

The design of our model is influenced by a famous theory of how people think about risk. The theory, due to Daniel Kahneman and Amos Tversky, is known as "Prospect Theory" -- hence the title of our paper -- and eventually won Kahneman the Nobel Prize. Kahneman and Tversky argued that people derive pleasure and pain from "gains" and

[1] This is a preliminary draft. Please do not quote or cite.

"losses," respectively; and that they are more sensitive to losses than to gains, an idea they labeled "loss aversion".

In our paper, Huang, Santos, and I use these ideas to build a new – and hopefully, better – model of the stock market. We interpret what Kahneman and Tversky call a "gain" to mean an increase in the value of the stock market; and a "loss" to mean a drop in the value of stock market. And we take "loss aversion" to mean that investors are much more sensitive to stock market drops than to stock market increases.

I'm hoping that the reader finds our description of how investors think about stock market risk to be plausible and natural. I should note, however, that our assumptions are actually quite radical relative to traditional academic models of the stock market. Here is what I mean. In these earlier models, researchers assumed that investors do not get any pleasure or pain from stock market fluctuations per se, but only from *consuming goods and services*. In standard economic models, that's the *only* thing investors care about.

My co-authors and I don't agree that the *only* thing investors derive pleasure or pain from is the consumption of goods and services. In our view, investors derive pleasure and pain *directly* from stock market fluctuations. How can we justify this? Here is one way of thinking about it. When the stock market goes down, you feel bad because you have just received *bad news*: the fact that the stock market has fallen in value means that your overall wealth is lower, and therefore that the amount of goods and services you will be able to consume *in the future* is lower. As a result, fluctuations in the stock market generate feelings of pleasure and pain in their own right.

Application: the equity premium puzzle

We argue that one useful feature of our model is that it can address a long-standing puzzle about the stock market known as the "equity premium puzzle". The puzzle is the fact that the average return on the U.S. stock market over the past century was *much* higher than the average return on Treasury Bills. (The equity premium is the name given to the difference between the average return on the stock market and the average return on T-Bills. In short, then, the puzzle is that the historical equity premium was surprisingly high).

Now, of course, the average return on the U.S. stock market *should* be at least a little higher than the average return on T-Bills – the stock market is riskier than T-Bills, after all, and should therefore offer investors a higher average return to compensate for the higher risk. The problem is that traditional models of the stock market have a hard time justifying an equity premium as high as the one we've observed in historical data.

The framework we present in this paper can potentially explain the high historical equity premium. The intuition is straightforward. If people get pleasure (pain) from an increase (fall) in the stock market, and are more sensitive to stock market drops than to stock market increases, then they will perceive the stock market to be very risky. Essentially, they will say to themselves: "If the stock market goes up next year, I will feel good. But

if it goes down, I will feel *really* bad. So the stock market seems like a risky investment to me". But if investors perceive the stock market to be very risky, the average return on the stock market will have to be very high in order to compensate them for the high risk. So maybe *that's* why the historical equity premium was so high – to compensate investors for the high risk they perceived in the stock market.

I should emphasize that this explanation for the equity premium puzzle is not new to our paper – it first appeared in a famous paper by Shlomo Benartzi and Richard Thaler. What we do in this paper is to make the point in a more general way. Here is what I mean. As I noted earlier, traditional academic models of the stock market assume that investors derive pleasure or pain *only* from consuming goods and services. Benartzi and Thaler, however, assume that investors derive pleasure or pain *only* from fluctuations in the value of their stock market holdings. Huang, Santos, and I think that the truth lies somewhere in between. And so, in our model, investors derive pleasure and pain both from consuming goods and services *and* from stock market fluctuations. It took us a long time to get the mathematics of this right, but we're hopeful that the end result is a more accurate model of how investors think about risk.

Changes in loss aversion

The second contribution we make in this paper is to argue that the degree of loss aversion investors feel – i.e. how sensitive they are to a drop in the stock market -- may vary over time. In particular, we use experimental evidence to argue that, after experiencing a loss in the stock market, people become *more* loss averse than before (perhaps because, after getting one piece of bad news, they can't bear the thought of more bad news); and also that, after experiencing a rise in the stock market, people become *less* loss averse than before (perhaps because, with some good news as a cushion, they aren't as scared of potential future bad news).

Application: the volatility puzzle

Huang, Santos, and I build this assumption of changing loss aversion into our framework and argue that it might help us understand another classic puzzle about the U.S. stock market, the so-called "volatility puzzle". This refers to the fact that the historical fluctuations of the stock market seem too large to be justified by news about economic fundamentals alone.

The intuition for how changing loss aversion can explain the volatility puzzle is straightforward. If bad news about economic fundamentals pushes the stock market down, this creates a loss for people holding the stock market. This, in turn, raises their loss aversion, making them more scared of further drops in the stock market. This greater level of fear leads them to push the value of the stock market even further down, amplifying the volatility of the stock market, and thereby making the stock market appear more volatile than justified based on economic fundamentals alone.