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Career choice and the risk premium in the labor market [☆]

German Cubas [*], Pedro Silos

University of Houston, Temple University, United States

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ABSTRACT

We find a strong, robust, and positive correlation between average earnings and the standard deviation of both temporary and permanent idiosyncratic shocks to earnings across 19 US industries. Is this compensation for risk or for unobserved abilities? To answer this question we embed a Roy model into an incomplete markets equilibrium framework that features risk averse individuals who face industry-specific idiosyncratic shocks to their labor earnings. The interaction between earnings shocks and an individual's comparative advantage determines the optimal industry choice. Compensation for permanent shocks to labor earnings represents about two thirds of the observed correlation. There is no compensation for temporary risk. Compensation for risk explains about 40% of observed cross-industry differences in residual labor earnings. Additionally, workers accumulate different levels of wealth depending on their chosen industry.

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1. Introduction

The risk-return trade-off in financial assets has been extensively studied in financial economics and macroeconomics. Much work has been devoted to constructing economic environments whose quantitative predictions match the data. Although the findings of a large empirical literature suggest the labor market is a major source of risk for most workers, to date, a quantitative analysis of the risk-return trade-off in the labor market has not been attempted. As a first attempt, this paper poses and answers the following questions: Are labor earnings positively correlated with their volatility? If so, what does the standard framework for studying imperfect risk-sharing imply for the risk-return trade-off workers face in the labor market? What additional ingredients does the standard framework need in order to match and understand the facts on labor earnings and their volatility? Surprisingly, these questions have never been answered. Answers to those questions

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[*] Corresponding author at: University of Houston, 3623 Cullen Boulevard Room 204, Houston, TX 77204, USA. Fax: +1 713 743 3798.
E-mail address: gcubasnorando@uh.edu (G. Cubas).

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would improve our understanding of central topics in labor economics and macroeconomics, ranging from the measurement of risk in the labor market to policy-related issues such as redistribution and insurance policies and optimal taxation.

We begin by documenting two facts using the Survey of Income and Program Participation (SIPP). The first finding is a large dispersion in the variance (both transitory and permanent) of shocks to labor earnings across 19 US industries: Workers in the construction or transportation industries experience large permanent shocks to earnings, while those working in government and social services are insulated from earnings variability. Our specification for the stochastic process for shocks includes industry-specific probabilities of earnings adjustments, offering new insights regarding the nature, frequency and magnitude of the shocks. For some industries the probability of occurrence is low but the variance of the shocks (conditional on occurring) is large, and for others, the frequency of the shocks is high but the actual magnitude of the shocks, when they occur, is smaller.

Our second and new finding is a strong, positive, and robust correlation between mean earnings and the standard deviation of earnings across industries. This correlation is obtained using *net* or *residual* earnings as a dependent variable, i.e. once we control for other industry characteristics that affect the average level of earnings (education, age, etc.). The estimated coefficients imply a difference in average earnings, solely related to permanent risk, between the riskiest and safest industries of around 5%. When considering transitory shocks, the increase due to risk between earnings of workers in the safest and the riskiest industries is 3%. These correlations must be approached with caution. The study of the risk-return trade-off in labor markets is more complex than in financial markets, and as a result that positive correlation cannot immediately be associated with the existence of a risk premium in labor markets. Since workers are heterogeneous in their abilities and industries value some abilities more than others, the estimated correlation may be driven entirely by selection. In other words, high average earnings in risky industries may reflect the relative scarcity of particular abilities. Workers lacking such abilities would be unable to command high earnings even if they were willing to expose themselves to risk. It is then natural to ask, what portion of the correlation is compensation for risk and what portion is compensation for unobserved abilities?

To answer this question our starting point is the workhorse framework used to study risk-sharing in macroeconomics: an equilibrium consumption-savings model in which workers experience shocks (permanent and transitory) to their labor earnings. We introduce a career choice in which different careers represent industries. In our environment, risk-averse individuals choose an industry in which to supply labor services. Some industries are riskier than others and, everything else equal, they are less attractive. These industries are less attractive because shocks to labor earnings are not perfectly insurable. Since this environment says nothing about selection, it attributes any correlation between risk and the average level of earnings to compensation for risk. To account for selection, we assume that workers are ex ante heterogeneous: Each is endowed with an industry-specific ability, which drives a worker's comparative advantage, interacting with her risk aversion to determine an optimal career choice. To summarize, the model overlaps an Aiyagari (1994) economy, where markets are incomplete, with a Roy (1951) model, where workers self-select into different careers based on their comparative advantage.

We confront our model with US data from several sources. Earnings in the model are subject to permanent and transitory shocks. The stochastic processes driving these shocks are the same as those estimated using the SIPP. The parameters driving the industry-specific production functions are from National Income and Product Accounts data. In our benchmark case, we set the risk-aversion parameter to 3 and parameterize the distributions of abilities so that in equilibrium the model delivers the mean and standard deviations of the cross-sectional distributions of earnings observed in the data for each of the industries in the economy. Therefore, by construction, we replicate the documented positive correlation between mean earnings and their volatility in our benchmark case. Two important model predictions that are not matched in the calibration process arise and are noteworthy. First, the model predicts a distribution of workers into industries that resembles the distribution observed in US data. Second, the wealth-to-income ratios predicted by the model for each of the industries are positively correlated with their standard deviation of the permanent shock. This fact is established by Carroll and Samwick (1997) using data from the Panel Study of Income Dynamics (PSID).

Viewed through the lens of the model, the positive relationship between the permanent and transitory risk to earnings and the average level of earnings is a convolution of two forces: the compensation for risk and the compensation for industry-specific skills. Therefore, in order to separate the effect of these two forces into the observed differences in mean earnings, we proceed by performing a counterfactual exercise in which we eliminate individual differences in ability or comparative advantage. In other words, we consider individuals as ex ante homogeneous. In this counterfactual world, only the differences in the volatility of earnings across industries shape an individual's industry choice. This experiment yields two results. First, with the same value for the risk-aversion parameter, the model predicts the positive correlation between mean earnings and permanent risk (i.e. as in the data there is a risk premium). This correlation is two thirds of the one estimated in the benchmark case. Second, in this counterfactual exercise, the model predicts a no temporary risk premium. Thus, according to these results, the strong association between the standard deviation of transitory shocks and mean earnings observed in the data (which, in light of the reduced-form model, can be interpreted as a pure risk premium) arises entirely from selection and the permanent shock to earnings is the one that is compensated.

We further investigate what drives the correlation between earnings and the permanent and transitory risk. Once the sorting of workers has taken place, mean earnings in a particular industry are the result of the product of the mean abilities of workers and the equilibrium wage rate. Thus, our model allows us to quantify the relative roles of the amount of human capital (abilities) versus the unit price of human capital (the wage rate) in explaining the overall correlation between

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