Aggregate Consequences of Income Risk Shocks in Colombia

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The author serves as the Senior Researcher at the Central Bank of Colombia when the analysis in this paper was performed. There is no other relevant and material financial relationships that bear on this research.

INTRODUCTION

* It is believed that households face large income uncertainty that varies substantially over the business cycle.

* Colombia is a developing country with a substantial informal labor market, and a low percentage of households holding assets; besides, most of those assets are illiquid assets in the form of housing real state. In this context, it is relevant to understand how aggregate demand, liquid and illiquid asset holdings, and consumption demand respond to income uncertainty shocks.

* I explore empirically the response of aggregate portfolio liquidity and aggregate activity to shocks in idiosyncratic income uncertainty in the context of the Colombian economy. I explore the welfare implications of such shocks and the policy response.

BACKGROUND

* It has been documented that in develop economies shocks to household income are large and exhibit systematic changes over the business cycle. Storesletten, Telmer, and Yaron (2001) estimate that for the United States the variance of persistent shocks to disposable household income almost doubles in recessions.

* To the best of my knowledge there is no equivalent evaluation previously made for the Colombian economy on this topic.

* The theory that serves as starting point of the present paper is that households use precautionary savings and structure their portfolios to smooth consumption if asset markets are incomplete and assets differ in their liquidity. Therefore, in such a setting, swings in the riskiness of household income lead not only to systematic variations in the propensity to consume, but also to a rebalancing of household portfolios. How much of those variations and rebalancing would be seen in the Colombian economy? As it is shown in the preliminary data, the dynamic and composition of the liquidity premium, equity premium and housing rent-price ratio in Colombia are very different from those of the United States and, therefore, the expected result is that the aggregate response to uncertainty shocks would be different from those observed in a developed economy like the US.

* My paper adds to the literature that explores the aggregate effects of time-varying uncertainty by exploring portfolio adjustment as a channel through which uncertainty affects real activity in the context of a highly informal labor market and low household participation in asset markets.

PRELIMINARY DATA

The contrast between the United States and Colombia in the dynamic of the liquidity premium, the equity premium and the house-rent-price ratio is striking, as can be seen in the table and figures below.

In the United States, the three variables have very similar averages but very different medians. The median of the house rent-price ratio is about 2% of that of the equity premium, and about 9% of that of the liquidity premium. Furthermore, the liquidity premium and the house rent-price ratio have about the same standard deviation, while the equity premium is much more volatile.

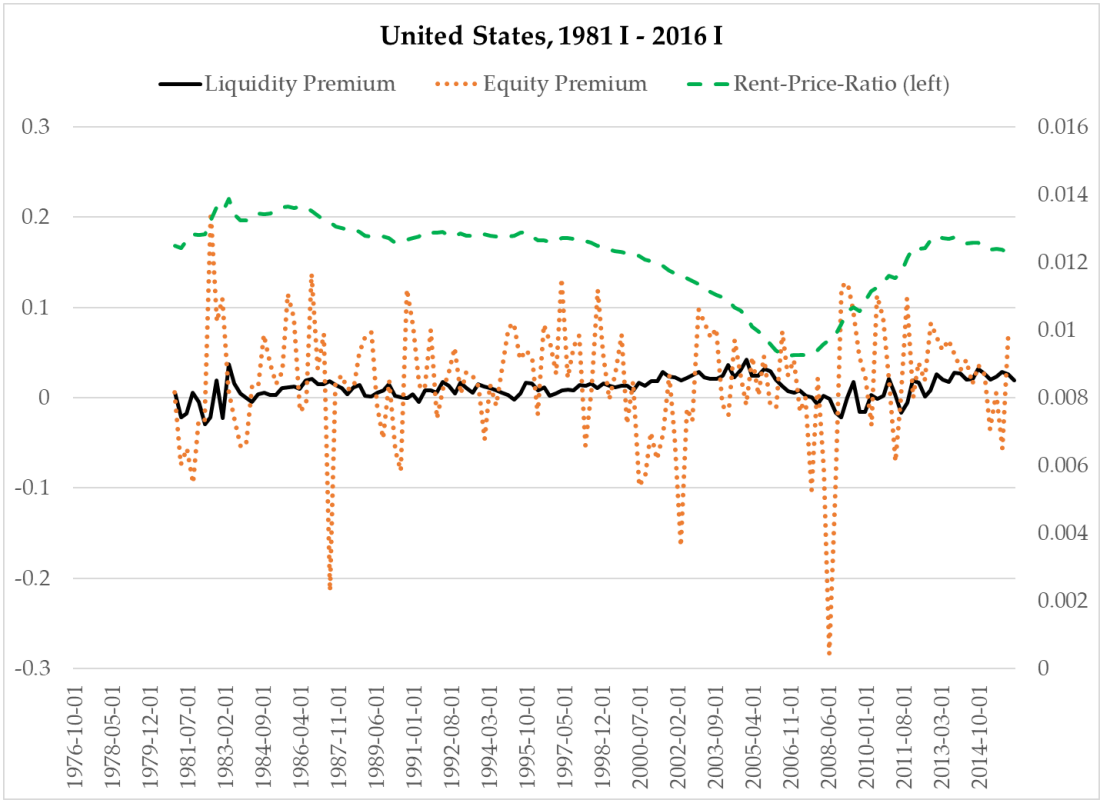
In contrast, in Colombia, the three variables have similar median but different averages. The liquidity premium and the house rent-price ratio follow similar paths, while the equity premium has a negative average for the period and very small variance. This data reflects the fact that the lion's share of total assets for Colombian households is driven by real house prices as houses make up most of illiquid assets of households, and illiquid assets comprise most of their total assets.

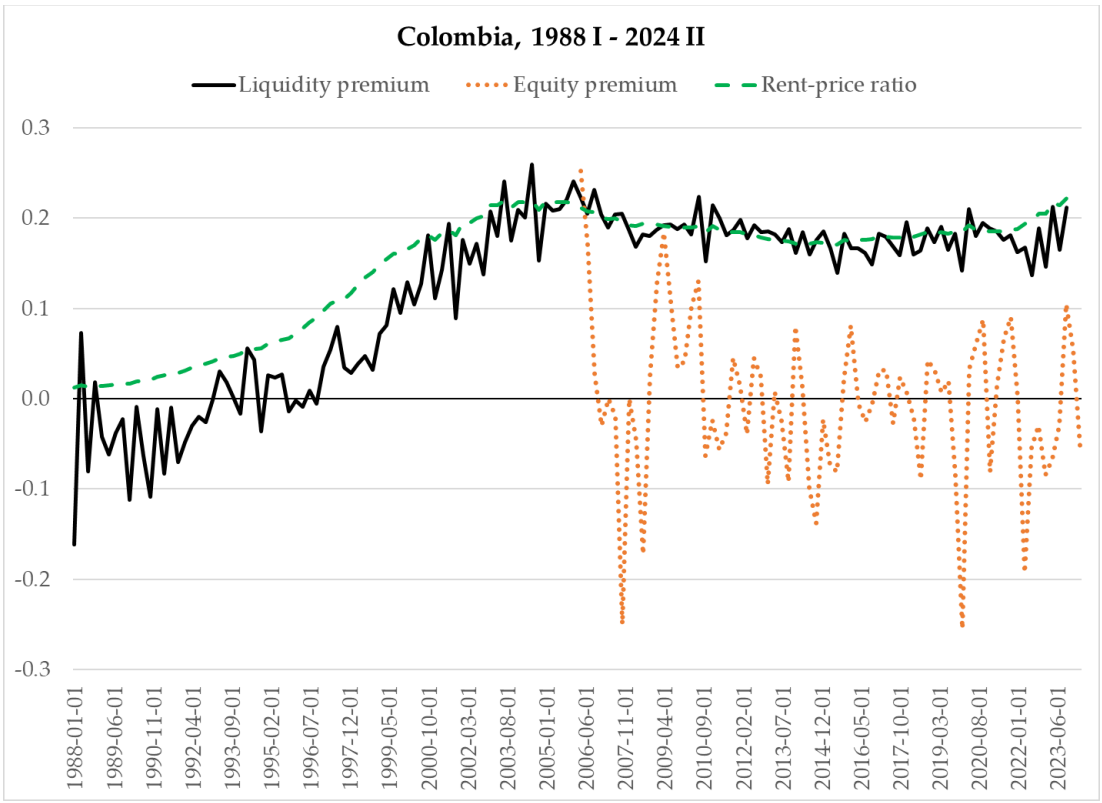
	Liquidity Premium	Equity Premium	Rent-price Ratio
	United States 1981 I - 2016 I		
Average	0.0107	0.0177	0.0122
Median	0.0128	0.0660	0.0012
St. Dev.	0.0114	0.0214	0.0126
	Colombia 1988 I - 2024 II		
Average	0.1203	-0.0030	0.1485
Median	0.0944	0.0875	0.0671
St. Dev.	0.1658	0.0012	0.1796

METHODOLOGY

I follow Bayer et al. (2019) to estimate the time-series behavior of household income risk using microdata from the GEIH[1] and then use these estimates to understand the aggregate consequences of a rise in income risk.

[1] Gran Encuesta Integrada de Hogares. It is a continuous household survey conducted by the Colombia´s Departamento Administrativo Nacional de Estadística (DANE). The GEIH sample is selected every year to be representative at the national level as well as for 23 main cities[1] plus the domain *other municipal capitals, populated centers, and scattered rural areas*. The GEIH provides information about the size and structure of the labor force in Colombia, as well as on their sociodemographic characteristics.


United States, 1981 I - 2016 I
Liquidity Premium
Equity Premium
Rent-Price-Ratio (left)
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
1976-10-01
1978-05-01
1979-12-01
1981-07-01
1983-02-01
1984-09-01
1986-04-01
1987-11-01
1989-06-01
1991-01-01
1992-08-01
1994-03-01
1995-10-01
1997-05-01
1998-12-01
2000-07-01
2002-02-01
2003-09-01
2005-04-01
2006-11-01
2008-06-01
2010-01-01
2011-08-01
2013-03-01
2014-10-01


Colombia, 1988 I - 2024 II
Liquidity premium
Equity premium
Rent-price ratio
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
1988-01-01
1989-06-01
1990-11-01
1992-04-01
1993-09-01
1995-02-01
1996-07-01
1997-12-01
1999-05-01
2000-10-01
2002-03-01
2003-08-01
2005-01-01
2006-06-01
2007-11-01
2009-04-01
2010-09-01
2012-02-01
2013-07-01
2014-12-01
2016-05-01
2017-10-01
2019-03-01
2020-08-01
2022-01-01
2023-06-01

As in Bayer et al. (2019), my income measure is household labor income after taxes and transfers. The GEIH data are originally available at monthly frequency and represent individual-level income data. I aggregate these data to the household level and to quarterly frequency, restricting the data to households whose head is at least 30 and below 56 years of age. Unlike Bayer et al. (2019), I do not have panel data. Therefore, I follow a cohort approach as in Storesletten, Telmer, and Yaron (2001, 2004).

In a first step, I estimate the effect of observable household characteristics on household labor income by ordinary least squares (OLS) to remove this non-stochastic part and work with residual income. I then generate short panels of residual income and its first two lags for each household-cohort in a sample quarter t. From these data sets, we calculate the sample variance (j = 0) and first two autocovariances of residual income for cells defined by survey quarter, t, and cohort c, the quarter when a household head turned 30. These empirical autocovariances equal their theoretical counterparts up to sampling error. Then, I formulate a quasi-maximum-likelihood estimator for the parameters of interest along with the sequence of shocks to income risk.

As in Bayer et al. (2019), I use the estimated sequence of shocks to household income risk to estimate their repercussions on aggregate economic activity and average household portfolios. I will explore the effects on GDP, consumption, investment, unemployment rate, aggregate productivity (Solow residual), central government's deficit, nominal interest rate, real wages, average portfolio liquidity, house prices, and the liquidity premium.

I estimate the aggregate response by local projections using the shock series identified from the GEIH data while controlling for lagged aggregate variables, lagged income risk, and a time trend.

REFERENCES

Christian Bayer & Ralph Luetticke & Lien Pham-Dao & Volker Tjaden, 2019. "Precautionary Savings, Illiquid Assets, and the Aggregate Consequences of Shocks to Household Income Risk," Econometrica, Econometric Society, vol. 87(1), pages 255-290, January.

Kjetil Storesletten & Chris I. Telmer & Amir Yaron, 2001. "The welfare cost of business cycles revisited: Finite lives and cyclical variation in idiosyncratic risk," European Economic Review, Elsevier, vol. 45(7), pages 1311-1339.

Kjetil Storesletten & Chris I. Telmer & Amir Yaron, 2004. "Cyclical Dynamics in Idiosyncratic Labor Market Risk," Journal of Political Economy, University of Chicago Press, vol. 112(3), pages 695-717, June.