How Risky are the U.S. Corporate Assets?

Tetiana Davydiuk, Scott Richard, Ivan Shaliastovich, and Amir Yaron*

January 2019

Abstract

Utilizing market data on corporate bonds and equities, we measure the aggregate market value of U.S. corporate assets and their payouts to investors. In contrast to per share equity dividends, total corporate payouts are very volatile, turn negative when corporations raise capital, and are acyclical. This challenges the notion of risk and return since the risk premium on corporate assets is comparable to the standard equity premium. To reconcile this evidence, we show that aggregate net issuances, which are acyclical and highly volatile, mask a strong exposure of total payouts' cash components to low-frequency growth risks. We develop an asset-pricing framework to quantitatively assess this economic channel.

*Tetiana Davydiuk (tetianad@andrew.cmu.edu) is at the Carnegie Mellon University. Ivan Shaliastovich (ivan.shaliastovich@wisc.edu) is at the University of Wisconsin-Madison. Scott Richard (scottri@wharton.upenn.edu) is at the University of Pennsylvania. Amir Yaron (yarona@wharton.upenn.edu) is at the University of Pennsylvania, the NBER and the Bank of Israel. We thank Sebastien Betermier, Gustavo Grullon, Lars Lochstoer, Sebastien Plante, Abraham Ravid, Michael Roberts, Robert Stambaugh, Paul Whelan, seminar participants at BI Norwegian Business School, Goethe University, Hong Kong University of Science and Technology, Wharton Business School, University of Hong Kong, and conference participants at UBC Winter Finance Conference, Utah Winter Finance Conference, European Winter Finance Conference, Northern Finance Association Meetings, European Summer Symposium in Financial Market, Early Career Women in Finance Conference, CMU/OSU/PITT/PSU Conference, Econometric Summer Society Meeting, and Society of Economic Dynamics Meeting.

1 Introduction

Large literature in financial economics focuses on understanding the risk and return on a per share investment in the equity of a firm, sector, or the market index. The value of such an investment is determined by the expectation of its future discounted payout, which for an equity share is equal to a dividend per share. This tight economic link between the riskiness of the equity prices and the equity dividends has been a subject of a large body of the macro finance research, from the business cycle risk models of Mehra and Prescott (1985) and Campbell and Cochrane (1999) to the long-run risks of Bansal and Yaron (2004) and rare disasters of Rietz (1988) and Barro (2006).

However, modern financial markets provide a variety of other means through which corporations channel resources to and sometimes from the investors. Public companies routinely issue and repurchase shares, which can be interpreted as a negative and positive payout to investors, respectively. Further, corporations borrow money by issuing corporate bonds, and thus can distribute funds through interest and principal payments as well as bond issuances and repurchases. The unifying feature of these resource distributions is that they are readily accessible to investors through regular financial markets by investing to or dis-investing from the equity and corporate bonds of the corporations, similar to standard per share equity investments.

A strategy which is particularly appealing economically is to consider the entire supply of corporate assets at the market index level. The corporate assets consist of total marketable equity and liability available to the investors through financial markets. The corporate payouts include total dividend and interest payments, as well as the proceeds from stock and bond issuances and repurchases. Holding the entire supply of corporate assets puts investors as close as possible to owning the whole corporate sector, through equity holdings in normal times or through bond holdings in contingency of bankruptcy or default. Economically, this aggregate, as opposed to per share equity, strategy is the closest match to a typical macro-finance paradigm which features ownership and transfer of aggregate resources between the representative firm and the representative investor.[1]

[1]Corporations hold other claims to and against customers, suppliers, banks, governments, and other economic entities; for example, consider accounts receivables, trade credits, bank loans, bank deposits, or policy and tax liabilities. Generally, these claims are not marketable, do not provide ownership rights, and cannot be directly accessed through the financial markets. As such, they are not part of our measure of the corporate assets and corporate payouts.

Accounting for total corporate payouts and valuations faces multiple challenges in the data. While equity data are widely available at a firm and index level, the market data for bonds are not as easily accessible. Second, the accounting liabilities which are not publicly traded are not part of our aggregate investment strategy, and have to be excluded from the measurements. Finally, aggregating across all the corporations raises a double counting problem as firms own corporate bonds and stocks themselves.

To address these empirical challenges, we rely on a variety of sources for equity, debt, and balance sheet data at a firm and index level, such as CRSP, Compustat, Barclays aggregate corporate bond index database, and the Flow of Funds. Combining these data we uncover the market prices, returns and the payouts to the aggregate strategy of holding the entire supply of the U.S. corporate assets. The aggregate strategy has distinct features relative to standard per share stock market investments, which have important implications for understanding the risk and return tradeoff in the asset markets.

We show novel empirical evidence that risk properties of corporate payouts are quite different from those of typical per share equity dividends. First, accounting for net issuances, total payouts are often negative, meaning that there are periods when the corporate sector receives funds from investors rather than paying them out. Indeed, in our 1975-2017 sample total payouts go below zero about 56% of the time for bonds, 33% of the time for equity, and 37% of the time for total assets. Second, net issuances are highly volatile, and are a dominant component of the total payouts. They significantly raise the volatility of the total payouts relative to smooth cash distributions. Third, while cash payouts are strongly pro-cyclical, total payouts are generally acyclical, both at short and long horizons. For example, the correlations of consumption growth with changes in asset cash payouts increase from 20% at a 1 quarter horizon to 40% at a 5-year horizon. On the other hand, the correlations of consumption growth with changes in total asset payouts are nearly zero at all the considered horizons. Intuitively, both aggregate issuances and repurchases tend to increase during expansion periods, leading to acyclical net issuances and thus total payouts. Our market value of debt reveals that much of these adjustments take place along the debt side of the corporation.

The evidence for the acyclicality of total payouts is especially puzzling given that asset returns are predominantly equity-like. The asset return averages 6.9%, comparable to 7.9% for the equity, and the correlation between the two is in excess of 99%. The asset returns are also considerably exposed to movements in economic growth, especially at long horizons. Taken together, the payout and return evidence challenges standard notions of risk and return in the finance literature.

The evidence of acyclical total payouts raises an important question about the economic nature and sources of risk in financial markets, i.e., what risks are being compensated? In addition, negative payouts provide a methodologically challenging aspect for standard models as well as data characterization.[2] We develop a long-run risk type model that helps explain the above features of the asset market data while accounting for the dynamics of total payouts and specifically, for the possibility of negative payouts. In the model payouts are indeed not procyclical, yet their exposure to long run growth risk generates a sizeable premium over the risk free rate. This mechanism, which underlies many long run risk model calibrations, emphasizes that it is not the business cycle risk that drives the unconditional risk premium, but a risk of a longer duration. In this regard the model highlights the tension between matching the acyclical dynamics, higher volatility, and lower persistence of total payouts relative to standard dividend cashflows and the large asset premium.

Related Literature. Our focus on broader notions of cashflows which account for repurchases and issuances is related to several strands of the literature. Fama and French (2001) and Grullon and Michaely (2002) are among the early papers that highlight the changing nature of firms' payouts. Dittmar and Dittmar (2004), Guay and Harford (2000), and Jagannathan, Stephens, and Weisbach (2000) discuss the role of repurchases as the preferred form of distributing the transitory component of earnings, as dividend policy requires financial commitment. Bansal, Dittmar, and Lundblad (2005) incorporate repurchases to their alternative measure of dividends to measure cash flow risk. Boudoukh, Michaely, Richardson, and Roberts (2007) find that total equity payouts, which include repurchases and issuances, provide stronger evidence of return predictability than cash dividends alone. Closest to our work are Larrain and Yogo (2008), Bansal and Yaron (2007) and Choi and Richardson (2016). Larrain and Yogo (2008) analyze, using standard VAR return decomposition, the connection between total payouts and asset price fluctuations. Importantly, their measures of payouts are based on book, rather than market values of debt, as in our work. In addition, our main focus is on understanding the cyclicality and the exposure of the payouts to economic risks. Bansal and Yaron (2007) focus on total payouts

[2]Indeed, it is no longer feasible to work with log growth rates because total payouts are often zero or negative.

in the equity market, and provide strong evidence for equity return and equity payout growth predictability. Choi and Richardson (2016) use market data on corporate bonds and equity to compute and characterize the dynamics of asset volatility, and their differences from the equity volatility. Relative to them, we focus on the properties and risk exposures of the corporate asset payouts.

Our findings are consistent with the evidence in Julliard and Parker (2005), Bansal, Dittmar, and Lundblad (2005), Hansen, Heaton, and Li (2008) and the basic premise of the long-run risks model of Bansal and Yaron (2004), which identifies low-frequency movements in economic growth as a key source of risk in financial markets. While these studies focus on equity markets, we show the relevance of these growth risk channels in bond and total asset markets. In terms of related work on corporate bond returns, Chen (2010) and Bhamra, Kuehn, and Strebulaev (2010) show the importance of low-frequency economic growth risks for the choice of the capital structure, dynamics of the leverage, and the riskiness of corporate bonds. Ferson, Nallareddy, and Xie (2013) show the role of growth risks in the cross-section of equity and corporate bond returns.

Our empirical findings are also important for interpreting the expanding literature of production based asset pricing; see Jermann (1998), Lochstoer and Kaltenbrunner (2010), Croce (2014), Kung and Schmid (2014), among many others. In that literature dividend dynamics are often counter-cyclical as large TFP improvements are associated with the desire to invest and not pay dividends. In these models the notion of dividends is an encompassing one and thus more closely related to our measure of total payouts. In that case, the production based models implications for dividends would accord better with the data, and the asset pricing would still be relevant with regard to the level of the observed risk premia.

The remainder of the paper continues as follows: Section 2 provides the data analysis. In Section 3 we consider an economic model, show how to address negative payouts, calibrate the model and provide quantitative results. Section 4 provides concluding remarks.

2 Empirical Analysis

2.1 Payouts and Valuations

In this section we describe the key relationships between valuations and payouts which underlie our empirical analysis. Unlike the majority of the literature which considers a per share investment strategy in equity, our main focus is on the aggregate strategy which is the claim to the entire supply of corporate capital. The payoff on this aggregate strategy includes standard cash distributions in the form of dividends and interest payments, and, importantly, non-cash distributions, such as share issuances and repurchases associated with equity and debt sides of the corporate balance sheet.[3] For simplicity, we lay out the discussion for a single asset (stock or bond), with an understanding that we can combine all the claims into the aggregate corporate sector index by summing up the valuations and payouts across all corporate assets and across all firms.

Consider a standard return/payoff relationship for holding one share of an asset between period t and $t+1$ (call it *per share* strategy):

$$P_t R_{t+1} = P_{t+1} + CF_{t+1}. \tag{1}$$

We are buying one share of an asset for a price P_t and earn a gross return R_{t+1}. The next-period total dollar payoff of $P_t R_{t+1}$ is split between a capital gain P_{t+1} and the cash payout CF_{t+1}. Cash payout refers to cash dividends or coupon/interest payments on equity or bond, respectively.

Now let us examine an investment strategy which holds N_t shares of the asset. For our main example, we consider holding all the publicly available asset shares whose number fluctuates due to issuances and repurchases. Our investment thus tracks the entire supply of the corporate capital (call it *aggregate* strategy). At time t the value of the aggregate strategy is $V_t = P_t \times N_t$. Because it is entirely invested into the underlying asset, its per dollar return is equal to the asset return R_{t+1}. Hence, the total dollar payoff is $V_t \times R_{t+1}$ The total dollar payoff represents the next-period capital gain $V_{t+1} = P_{t+1} \times N_{t+1}$ and the total

[3]Larrain and Yogo (2008), Boudoukh, Michaely, Richardson, and Roberts (2007) and Bansal and Yaron (2007) also consider broader notions of payouts which incorporate share issuances and repurchases.

payout to the investor $D_{a,t+1}$:

$$V_t R_{t+1} = V_{t+1} + D_{a,t+1}. \tag{2}$$

It is easy to show that the aggregate payout is made up of aggregate cash payouts and net share issuances:

$$\begin{aligned} D_{a,t+1} &= V_t R_{t+1} - V_{t+1} = (P_{t+1} + CF_{t+1}) \times N_t - P_{t+1} \times N_{t+1} \\ &= N_t \times CF_{t+1} - (N_{t+1} - N_t) \times P_{t+1} \\ &\equiv D_{t+1} - NI_{t+1}, \end{aligned} \tag{3}$$

where $D_{t+1} \equiv N_t \cdot CF_{t+1}$ is the aggregate cash payout, and $NI_{t+1} \equiv ISS_{t+1} - REP_{t+1}$ is the aggregate net issuance. The issuances ISS_{t+1} and repurchases REP_{t+1} capture the transfer of resources in and out of the firm, respectively. The outflow at date $t+1$ is given by,

$$REP_{t+1} \equiv - \{N_{t+1} - N_t\}^{-} P_{t+1} \geq 0. \tag{4}$$

It is positive when there is a repurchase of the existing shares, i.e. when $N_{t+1} - N_t \leq 0$. Similarly, define issuances as:

$$ISS_{t+1} \equiv \{N_{t+1} - N_t\}^{+} P_{t+1} \geq 0. \tag{5}$$

This represents the inflow of resources following a new issuance of shares when N_{t+1} is greater than N_t.

There are several important similarities and differences between the per-share and aggregate strategies defined in (1) and (2), respectively:

1. The two strategies earn the same return. Indeed, the money is invested in the same asset, so the return is the same *per every dollar* invested.

2. The two strategies have different *total dollar* payouts and valuations. The value and payouts on a per share strategy do not directly depend on the number of shares. For an aggregate strategy, issuances (buying shares) act like a negative distribution, while repurchases (selling shares) are like a positive dividend. At the same time, issuances and repurchases affect the value of the aggregate investment strategy V_t. Other things the same, positive issuance increases contemporaneous valuations, while repurchases decrease it. This

affects the interpretation of per-share versus aggregate payouts. For example, a drop in a per share dividend is typically viewed as a bad outcome for the per-share investor. However, a drop in the aggregate payout caused by a large share issuance can actually represent good times for a firm seeking more resources for profitable opportunities, and is accompanied by an increase in the market value of the aggregate strategy.

3. Per share dividends are always positive, while the distributions from the aggregate strategy do not have to be. When there is a large issuance, resources flow from investors into the corporate sector. In principle, the need for new corporate capital can be large enough to leave the aggregate investor with a negative total payout. As we discussed in the previous point, this negative payout does not necessarily represent a bad time for the investors. The market value of the strategy can gain value as firms are seeking additional capital to exploit profitable opportunities.

4. Both strategies admit a usual present-value relationship. Applying the Euler equation for the per-share return (1) and iterating forward, we obtain

$$P_t = \sum_{j=1}^{\infty} E_t \left(M_{t,t+j} CF_{t+j} \right), \tag{6}$$

where $M_{t,t+j}$ denotes the stochastic discount factor between time t and $t+j$. A transversality condition $\lim_{j\to\infty} E_t \left(M_{t,t+j} P_{t+j} \right) = 0$ ensures the existence of the valuations and rules out bubbles. In a similar way, we can apply the Euler condition to the aggregate strategy in (2):

$$V_t = \sum_{j=1}^{\infty} E_t \left(M_{t,t+j} D_{a,t+j} \right) = \sum_{j=1}^{\infty} E_t \left(M_{t,t+j} D_{t+j} \right) - \sum_{j=1}^{\infty} E_t \left(M_{t,t+j} NI_{t+j} \right), \tag{7}$$

under the transversality condition $\lim_{j\to\infty} E_t \left(M_{t,t+j} V_{t+j} \right) = 0$.

The valuation equations above can include both positive and negative payouts. The value of a per-share investment is guaranteed to be positive because per-share payouts are never negative. For an aggregate strategy, this is not necessarily the case. For a strategy following an arbitrary number of shares its valuation can become negative or violate a transversality condition. However, economic intuition suggests that the capital inflow to the corporate sector is generally associated with profitable growth opportunities. In the present value sense, net issuances generate positive corporate distributions, so that the the value of the entire corporate capital is positive.

5. Finally, the per-share and aggregate strategies differ in applicability: the aggregate strategy is particularly relevant in the context of macroeconomic and macro-finance literature which features transfers of resources between the representative firm and the representative agent at the economy-wide level. The aggregate, rather than per share, payouts and valuations should then be used to assess the nature and magnitude of risks in the corporate sector, and to evaluate the risk and return implications of such models. In subsequent sections we describe our approach to measure aggregate payouts and valuations associated with debt, equity, and asset side of the U.S. corporate sector, and highlight their economic implications relative to the standard measurements.

2.2 Data and Empirical Measurements

We use market data on prices, shares, and distributions to characterize returns and distributions on corporate assets accessible to investors through financial markets. For the benchmark analysis, we are focusing on the aggregate market which consists of the entire cross-section of public corporations, including most of the financial sector. Financials such as banks, holding companies and insurance companies generate an important value-added for the investors and the economy, and are part of our aggregate strategy. On the other hand, we exclude investment vehicles such as mutual funds, closed-end funds and ETFs which provide the means for investors to access the markets. Our analysis effectively treats these establishments as a part of the representative investor; separating their net market value and relative contribution would require a detailed data on holdings, and is beyond the scope of this paper.

For our empirical analysis, we calculate cash payouts (dividend and/or interest payments), share net issuances, and total payouts associated with debt, equity, and total corporate assets of the U.S. corporations, and compute market prices and returns on aggregate strategies of owning the entire supply of these claims. There are several challenges for our empirical exercise. The market data for bond valuations and distributions are not as easily available as for equities, and the majority of studies in the literature have resorted to book rather than market valuations.[4] However, market values of debt, especially at

[4] It has been common either to use book values to capture debt valuations or approximate market values by imputing the maturity distribution of long-term debt as pioneered by Brainard and Shoven (1980). See also Bernanke and Campbell (1988), Hall, Cummins, Laderman, and Mundy (1988), Richardson and Sloan (2003), and Larrain and Yogo (2008).

long maturities, can significantly drift away from their book values over time, which can affect empirical measurements. Second, some types of accounting liabilities (e.g., accounts payable and bank loans for the firms, deposits for the banks, policy liabilities for the insurance companies) are not publicly traded, and their valuations and payouts have to be excluded from our empirical measures. Finally, aggregating across all the corporations raises a double counting concern as firms can own corporate assets themselves. In our empirical implementation we aim to address these issues, subject to the limitations and the availability of the data.

Equity-related measurements. To measure equity-related variables, we use the Center for Research in Security Prices (CRSP) Monthly Stock File. The dataset provides equity price per share (*prc*) and share data (*shrout*) at an individual security level, as well as holding period returns including and excluding dividends, *ret* and *retx*, respectively. We include only common stock listed on NYSE, AMEX, NASDAQ, and NYSE Arca stock exchanges.[5] Similar to Boudoukh, Michaely, Richardson, and Roberts (2007) and Larrain and Yogo (2008), we measure individual stock i net issuance in month t as a change in shares outstanding valued at the month-end share price:[6,7]

$$ni_{it} = prc_{it} \times shrout_{it} - prc_{it-1} \times shrout_{it-1} \times (1 + retx_{it}) . \tag{8}$$

Different from Boudoukh, Michaely, Richardson, and Roberts (2007) but similar to Larrain and Yogo (2008), we also account for changes in the entity structure due to initial public offerings, mergers, acquisitions, and exchanges. Conceptually, this is aligned with our aggregate strategy which calls for buying or selling asset shares as they become available or disappear in the financial markets, respectively. We show that our main results are not sensitive to changes in entity structure in the robustness Section 2.4.

[5] We have checked that including preferred stocks and/or excluding government-sponsored enterprises (GSEs) does not have a material effect on our results.

[6] This is equivalent to measuring net issuances as the value of the change in the number of shares over the period, appropriately adjusted by the cumulative adjustment share and price factors *cfacshr* and *cfacpr* that account for splits and other corporate events:

$$ni_{it} = (shrout_{it} \times cfacshr_{it} - shrout_{it-1} \times cfacshr_{it-1}) \times prc_{it}/cfacpr_{it}.$$

[7] Valuing net issuances at the average of beginning-of-month and end-of-month prices, as in Boudoukh, Michaely, Richardson, and Roberts (2007), instead of the month-end prices as in Larrain and Yogo (2008) does not impact our results

We use firm's market capitalization on the first trading month, $shrout \times prc$, to measure net issuances during the IPO. We use CRSP delisting data to identify securities with delisting codes of $2xx$ and $3xx$, and use their delisting price (*dlprc*) and the delisting return (*dlretx*) to account for the repurchases during mergers and acquisitions. We aggregate the firm-level data and compute market valuations, dividends, returns, and net issuances at the aggregate level.[8]

Corporations buy and hold equity shares in other firms. Equity cross-holdings lead to double counting in our measurements: payouts and valuations of the same equity are counted once at the issuer level, and the second time through the valuations and the payouts of the corporate buyer. To account for that, we use the Financial Accounts Guide data from the Federal Reserve system and compute the market value of corporate equity held by nonfinancials, banks, insurance companies, and funding corporations. We use these data to adjust the market value of the aggregate equity available to investors. Unfortunately, we do not have access to the holdings data to determine the returns and the payouts to the equity held by corporations. As a first approximation, we assume that the returns to corporate-owned equity are the same as to the aggregate stock market returns. This allows us to infer the payouts to corporate equity holdings, and adjust the payouts to the aggregate strategy.

Debt-related measurements. U.S. corporations issue a wide variety of debt instruments, and most of the trade takes place at the over-the-counter (OTC) dealer's market. As such, there is no convenient centralized platform to obtain market valuations and distributions for the total debt issued by the firm, and identify its publicly traded components. Indeed, corporate balance sheets typically report book values of debt which are inaccurate measures of its market value especially for long-term bonds away from the issuance date. Sources for the market bond prices, such as Trace database, have limited coverage before mid-2000s, and typically rely on transaction prices which may be stale at higher frequency.[9] Further, accounting statements routinely lump public and bank debt together; however, bank debt is generally not publicly traded, and its quantity and payout are not part of the aggregate

[8] Bansal and Yaron (2007) and Welch and Goyal (2008) measure aggregate net issuances directly in the market index data as $MCAP_t - MCAP_{t-1} \times (1 + VWRETX_t)$, where $MCAP$ is the market capitalization and $VWRETX$ is the value-weighted return excluding distributions. The index and firm-based approaches treat differently firm exits for reasons other than mergers, acquisitions and exchanges; e.g., defaults and bankruptcies would show up as negative net issuances using the index data, but not in our approach using the firm level data. Empirically, however, the two measures are quite similar.

[9] An ongoing work to construct reliable and comprehensive dataset for market bond prices includes Choi and Richardson (2016) and Gomes, Kilic, and Plante (2018).

strategy we are interested in. Moreover, adding traded or non-traded bank debt causes double counting: banks are part of our aggregate investment strategy, and the proceeds from loans they generate are already reflected in the valuations and payouts on their corporate assets.

To tackle these issues, we bring novel bond market value data from Barclays Indices. The Barclays Indices are widely used throughout the financial industry because of their accuracy and wide range of market coverage. Reported market capitalizations and month-to-date index returns are updated on daily basis, and our data is taken on the last trading day of the month when bond prices are hand marked by traders. Reported total returns are decomposed into coupon returns and price returns which facilitates calculation of monthly coupon cash flows and net issuances.[10]

Barclays Indices represent many types of debt instruments, varying from debentures and asset-backed bonds to commercial paper issues, and our goal is to measure all of the outstanding corporate debt. To capture long duration debt, we include the following sub-indices of the Barclays U.S. Universal Index: Corporate Investment Grade (IG), Corporate High Yield (HY), 144A Ex Aggregate, Commercial Mortgage-Backed Securities (CMBS) and Fixed Rate Asset-Backed Securities (ABS). All of the bonds represented in the above sub-indices have fixed-rate coupon, are fully taxable, include both senior and subordinate debt, and must have at least one year-to-final maturity.[11] Additional details for the characteristics of the bonds are given in the Appendix A, Table A.1. We further augment our debt measure with corporate issues of taxable municipal bonds, in particular Industrial Development Revenue Bonds (IDR), Pollution Control Revenue Bonds (PCR), and U.S. Convertibles Composite Index, since those are outside of the Universal Index.

To measure debt of short duration, we include the following Barclays sub-indices: Asset-Backed Securities Floating Rate (ABS FRN), Floating Rate Notes (FRN), and Floating Rate Notes High Yield (FRN HY). The floating-rate securities in the above sub-indices may have longer maturity, but their interest rate durations are typically less than 1 year. More details are given in the Appendix A (Table A.1). We further augment our measure with short-term debt valuations from the Compustat and Flow of Funds. For many of these instruments, we have to rely on reported book values. However, the value of short-duration debt is insensitive

[10]Unlike for equities, we do not have access to individual bond data, so the payout and valuation computations are done at the index level.

[11]The Universal Index excludes bonds that has less than 1 year to maturity as they become money market eligible. ABS and CMBS must have a remaining average life of at least one year, while bonds that convert from fixed to floating rate will exit the sub-indices one year prior to conversion.

to movements in interest rates, and book values provide reasonable assessments of the market valuations.

First, we consider the net short-term borrowing through commercial paper. While the commercial paper amounts are sparsely populated in Compustat, Flow of Funds tracks issuing and lending in the commercial paper markets by the investor class (financial, non-financial, banks, etc). To compute the payouts accessible to the representative investor, we take the financial and non-financial issuers, and net out the amounts bought by the non-financial corporations, banks, credit unions, insurance companies, GSEs, and funding corporations. We use a 3-month commercial paper rate before 1997 and 3-month financial and non-financial commercial paper rates post 1997 from the FRED to construct coupon cash flows.

Second, we include long-term debt due in 1 year (Compustat item DD1), which represents the total amount of long-term interest-bearing obligations due in the current year. In addition to corporate debt, it also includes non-tradable obligations, such as bank loans, mortgages, leases, etc. The database does not separate these items, so using the total value of debt due in 1 year overestimates the value of tradeable short-term debt, while excluding it completely would underestimate it. We incorporate these valuations for the benchmark analysis, and examine the sensitivity of our results excluding this item. Coupon cash flows are constructed multiplying valuations by the commercial paper rate.

We combine the data across different sources to come up with our proxy for the aggregate value of corporate bonds, and decompose its total payouts into cash (interest payments) and net issuance components. Similar to equity, we are also facing a double counting issue due to cross-holdings of bonds. The issue is particularly relevant for the corporate bond markets as about 25% of total corporate bonds are directly held by the insurance companies. To tackle this issue, we obtain the data on corporate bond holdings by the insurance companies from the FRED. We scale down the reported book quantities by the ratio of total assets of public insurance companies from the Compustat to total assets of public and private insurance companies from the FRED to adjust for the fact that FRED does not separate publicly traded and closely held companies. We then convert the book quantities to the market values by multiplying it by the market-to-book ratio for our aggregate bond index. This is justified under the assumption that, as a first approximation, the corporate bond holdings of the insurance companies are not significantly different from the aggregate market. In the same vein, we use the returns on the aggregate corporate bond index to compute the implied cash payouts to insurance companies. We check the sensitivity of our results to excluding the insurance companies all together (see Robustness Section 2.4).[12]

In addition to the asset prices, we also use aggregate macroeconomic data. We collect the data on GDP and consumption, defined as the sum of expenditures on non-durable goods and services, from the BEA tables. The data on CPI inflation come from the Bureau of Labor Statistics. The price level is normalized to 1 in December of 2009. All the nominal quantities are deflated by the CPI to obtain real measures.

Our benchmark sample covers the period from 1975 until 2017, due to the availability of the bond data from Barclays. For some of our supplemental analysis we also use equity only data that go back to the 1930s.

2.3 Empirical Evidence

2.3.1 Market Prices and Returns

We start our empirical analysis by describing the key properties of market capitalizations and returns to equity, debt, and corporate assets of the U.S. corporate sector.

Figure 1 shows the evolution of the components of corporate debt. The Figure shows the raw values of the corporate bond valuations unadjusted for corporate bond cross-holdings. As can be seen on the top panel, investment grade bonds made up the entirety of our measure of long-term debt in the beginning of the sample. The role of other debt instruments, especially high-yield bonds and 144A issues, has significantly increased over time and helped fuel growth in the corporate debt market. By the end of the sample, the real market value of the long-term corporate debt has reached over 8 trillion December 2009 dollars, and nearly a half of it is comprised of non-IG bonds.

The bottom panel of Figure 1 shows that short-term non-bank corporate debt is nearly entirely made up of debt due in 1 year and commercial paper (CP), with Floating rate notes (FRN) and asset-backed securities (ABS) entering in early 2000s into the dataset. Unlike the long-term corporate debt whose value has been generally growing over time, the market

[12] Other liabilities of insurance companies, such as policy liabilities, are not marketable and do not represent ownership claims, and thus do not need to be included in our asset and payouts measures.

value of short-term debt increased from 0.11 trillion in 1975 to its maximum of 5 trillion in 2007, then precipitously fell during the Financial Crisis. It remains at its mid-1990s value of about 1.4 trillion at the end of 2017.[13]

Figure 2 shows the dynamics of the market capitalization of public debt, equity, and corporate assets, where the latter corresponds to the sum of the first two. Aggregate equity is on average four times as large as public debt, which leads to an estimate of public debt-to-equity ratio of 31%.[14] Asset and equity values are more volatile than debt, and also experience a larger growth over time. Our estimates suggest that the real market value of U.S. corporate assets grew from 3 trillion in mid-1975 to nearly 33 trillion at the end of 2017, which is comprised of 2.46 to 25.56 trillion increase for equity and 0.60 to 7.66 for bonds.

To assess the riskiness of aggregate equity, debt, and corporate assets, we provide basic summary statistics for the returns on these claims. Table 1 shows that in our sample, the average real equity return is 7.9%, with a standard deviation of 16%. The debt return is smaller on average, and is much less volatile: its mean is 3.2%, and its standard deviation is 6.6%. The asset return is the weighted average of the two, with the weight tilted more to equities which represent a larger fraction of the asset value. As shown in Table 1, the average asset return is 6.9%, and its volatility is 12.6%. Further, the asset and equity returns are nearly perfectly correlated. Hence, corporate assets in the U.S. are quite risky, and the magnitude and nature of risk is comparable to that of equities.

2.3.2 Payouts

We next consider the empirical evidence for the payouts to debt, equity, and corporate assets. Following the discussion in Section 2.1, for each of these instruments total payouts can be broken down into cash distributions (dividends or interest payments) and net share issuances.

Figure 3 shows the time series of the total payouts and their cash and net issuance components. Naturally, cash payouts are positive. On the other hand, net issuances are

[13]This is consistent with the evidence in Kacperczyk and Schnabl (2010) who document a significant decline in the commercial paper during the Financial Crisis. They suggest substitution to other sources of financing, adverse selection and the inability of issuers to issue the commercial paper, and institutional constraints as potential reasons for the collapse.

[14]Recall that we focus on public debt, and exclude bank debt from our computations.

not restricted to be of any sign. At times when firms opt for a net distribution of resources through repurchases, net issuances are negative. They are positive when firms attract capital through new share issuances. In our sample, net issuances of equity, debt, and corporate assets are mostly positive: corporate sector generally draws resources from the investors. Figure 3 also shows that net issuances are much more volatile than cash distributions, and thus are a dominant component of total payouts. Compared to cash distributions, total payouts are very volatile, and can actually be negative: in our sample, they go below zero about 56% of the time for bonds, 33% of the time for equity, and 37% of the time for total corporate assets.

To formally analyze statistical properties of the payouts, we need to convert them into stationary variables: in levels, payouts are a random walk. However, standard methods of using logarithms to define growth rates do not work in our setting because payouts can be negative. To compute growth rates, we instead normalize a change in the level by the aggregate economic indicator, e.g. $\frac{\Delta D_{a,t}}{C_t} = \frac{D_{a,t}-D_{a,t-1}}{C_t}$ for consumption or $\frac{\Delta D_{a,t}}{Y_t} = \frac{D_{a,t}-D_{a,t-1}}{Y_t}$ for output.[15] Generally, the units of the scaled change measure do not have an intuitive interpretation, and can depend on the level of the scaling indicator. For positive payouts, such as dividends or interest payments, the growth measure is approximately proportional to standard log growth rate: $\frac{\Delta D_t}{C_t} \approx \overline{\frac{D}{C}} \Delta \log D_t$, so up to a scale factor, a scaled change mainly represents fluctuations in the underlying payout growth.

Finally, notice that our change measure is additive. For example, because the level of corporate asset payouts is the sum of equity and debt, the scaled change in corporate asset payouts is equal to a simple sum of scaled changes in equity and debt payouts. Similarly, scaled changes in total payouts are equal to the changes in cash payouts net of changes in net issuances.

Figure 4 shows the time-series of scaled changes in cash payouts $\frac{\Delta D}{C}$, net issuances $\frac{\Delta NI}{C}$, and total payouts $\frac{D_a}{C}$ for equity, debt and total corporate assets. Table 2 documents the key summary statistics for these variables. The presented evidence highlights the significance of our novel payout components related to firms' debt and net issuances, which are missed by per-share cash payouts on equity.

[15] We have also examined normalizations by a previous period consumption level, $\frac{\Delta D_{a,t}}{C_{t-1}}$, by the average consumption level in the current and previous period, $\frac{\Delta D_{a,t}}{\frac{1}{2}(C_{t-1}+C_t)}$, by the constant non-linear trend of consumption, $\Delta \tilde{D}_{a,t} \equiv \frac{\Delta D_{a,t}}{exp\{gt\}}$ with $g = \frac{1}{T}\sum_{t=1}^{T} \Delta c_t$, and by excluding the scaling all together. The results are very similar to our benchmark.

First, debt payouts contribute significantly to corporate asset payouts. Interestingly, their contribution to payout fluctuations is larger than that of equity, even though the market valuation of corporate debt is 4 times smaller than of equity. Across all the components of the payouts, debt payouts are more volatile than equity, and thus determine a bigger fraction of the variation in total payouts. This is also confirmed by the correlation evidence: cash, net issuance, and total payouts are more strongly related to their respective debt than equity components.

Second, Figure 4 and Table 2 show that changes in net issuances are significantly more volatile than changes in cash payments, and are the main drivers of the fluctuations in total payouts. For example, the volatilities of changes in net issuances of equity and debt are 10 times larger than their corresponding dividend and interest cash payout counterparts. This implies that total payouts, which are equal to the difference between cash and net issuances, are very volatile, and are driven predominantly by net issuances. Indeed, the volatilities of the changes in total payouts are very similar to those of net issuances, and are nearly 10 times larger than the volatilities of the corresponding cash payouts.

Overall, the evidence suggests that total corporate asset payouts have very different properties than typical measures of corporate distributions, such as equity dividends. They are also quite distinct from other, earnings-based measures popular in the literature. Earnings capture profits generated by the firm during the period, and aggregate earnings are often used to measure total performance of the corporate sector. Aggregate earnings, however, are conceptually distinct from corporate asset payouts. They represent an accounting, rather than an economic measure based on actual distributions. They contain retained earnings, which represent the capital not paid out to the investors. Most importantly, earnings do not incorporate asset repurchases and issuances, which we argue are the dominant part of the corporate asset payouts. Because of that, aggregate earnings are more aligned with asset cash distributions, rather than asset total payouts. Indeed, in our sample, growth rate in aggregate earnings (EBIT) has a 41% correlation with changes in asset cash payouts, while its correlation with changes in total asset payouts is actually negative, -18%.

2.3.3 Economic Growth Risk Exposure

Our earlier analysis shows that corporate asset payouts are very volatile relative to equity payouts, and corporate asset returns are about as risky as equity returns. We next assess the economic exposure of asset returns and payouts to high and low frequency variations in macroeconomic growth. The exposure to fluctuations in economic growth is one of the main tenets of the macro-finance research, from the business cycle risk models of Mehra and Prescott (1985) and Campbell and Cochrane (1999) to the long-run risks approach of Bansal and Yaron (2004). It is a natural starting point for the analysis of the economic nature of risk in financial markets.

Payouts. First, we consider a business-cycle behavior of the payouts. Table 3 shows contemporaneous correlations of scaled changes in payouts with log consumption or output growth rates. We show the results for the benchmark annual sample from 1975 to 2017, for the 1975 to 2006 sample which excludes the Financial Crisis, at annual and quarterly frequencies. Notably, cash, net issuances, and total payouts have very different business cycle properties. Cash payouts tend to be procyclical: in the benchmark sample, the correlations of consumption growth with changes in cash payouts range between 0.29 for debt and 0.38 for corporate assets (0.30 and 0.44, respectively, using output growth to measure cyclicality). The correlations for corporate assets remain positive excluding the Financial Crisis and at a quarterly frequency, and are typically above 10%. These results are consistent with findings in the literature that equity dividend growth rates are positively correlated with aggregate growth, and extend the evidence to cash payments on debt and total corporate assets.

Table 3 further shows that changes in net issuances are acyclical and even countercyclical. The correlation estimates for net issuances are virtually always smaller, in absolute value, than those for the cash payouts, and are negative in more than half of the cases. For example, in our benchmark sample the correlation of consumption growth with equity net issuances is -0.16, and it is 0.06 and -0.06 for debt and total corporate assets, respectively. The fact that net issuances drive a large part of the variations in total payouts implies that total payouts are much less procyclical than the cash payouts. In fact, our estimates suggest that total payouts on corporate assets are essentially acyclical. In the benchmark sample, the correlation of consumption growth with total asset payouts is 0.11, and it drops to zero excluding the Crisis and in quarterly data. The reduction in the cyclicality of total payouts is due to both incorporating debt and net issuance data. Indeed, in the benchmark sample the equity payout correlation with consumption growth drops from 0.33 to 0.18 when we account for the net issuances of equity, and it drops further to 0.11 when we also include debt.

To expand the evidence beyond the short run (i.e., quarterly and annual horizon), we consider the term structure of the payout cyclicality, and compute multi-horizon correlations of consumption growth with changes in the payouts, e.g.

$$\rho_h \equiv Corr\left(\frac{\Delta D_{a,t}}{C_t} + \frac{\Delta D_{a,t+1}}{C_{t+1}} + ... + \frac{\Delta D_{a,t+h}}{C_{t+h}}, \Delta c_t + \Delta c_{t+1} + ...\Delta c_{t+h}\right),$$

for h equal to $0, 1, ..., 20$ quarters. We focus on quarterly growth rates to address the short sample concerns, and compute the GMM standard errors. We plot these correlations as a function of the horizon in Figures 5 and 6.

The multi-horizon results extend our short-run evidence in Table 3. Cash payouts are procyclical at all the horizons: the correlation estimates are all positive. For total corporate assets, the correlations of the cash payouts with consumption or output growth increase from 0.2 in the short run to 0.4 at 5 years. Procyclicality of corporate asset cash payouts reflects the fact that both of its two components, cash payouts on equity and debt, are procyclical. Interestingly, while the estimates of equity cash payout cyclicality are insignificant at long horizons and for debt in the short run, most of the estimates of asset cash payout correlations with economic growth are significant. Aggregating across various forms of capital distribution helps strengthen the statistical evidence for the exposure of their cash payouts to economic growth risks, especially at long horizons.

Unlike cash distributions, corporate asset net issuances tend to be acyclical at all the horizons: the correlations of aggregate growth with changes in corporate asset net issuances are economically and statistically indistinguishable from zero. The equity and debt components of net issuances are acyclical in the short run, consistent with the evidence in Table 3. At medium and long horizons, net issuance of equity is mildly procyclical and of debt is mildly countercyclical; however, most of the estimates are insignificant. Aggregating across the components with opposite cyclicality leads to the result that changes in net issuance of corporate assets do not respond to high or low frequency movements in the fundamentals.

Total payouts are equal to the difference between cash payouts and net issuances. Due to their relatively high volatility, net issuances drive most of the fluctuations in total payouts, so the correlation patterns for total payouts are effectively the mirror image of those of the net issuances. For corporate assets, total payouts appear acyclical: the correlation of their net changes with economic growth are essentially zero. Similar to the short-run evidence, this finding is driven both by accounting for share net issuances and bond components. Indeed, without net issuances, corporate asset cash payouts are strongly procyclical, while without debt component, total equity payouts are mildly procyclical at medium and long horizons.

Returns. We use a similar approach to assess the exposure of returns to high and low frequency movements in aggregate growth. We consider the term structure of return cyclicality, and compute multi-step correlations of returns on equity, debt, and corporate assets with consumption or output growth, e.g.

$$\rho_h \equiv Corr\left(r_t + r_{t+1} + ... + r_{t+h}, \Delta c_t + \Delta c_{t+1} + ...\Delta c_{t+h}\right),$$

for h equal to $0, 1, ..., 20$ quarters. We plot these correlations as a function of the horizon in Figure 7. Virtually all of the correlations are positive, which suggests that returns are risky with respect to growth fluctuations. The estimates tend to be smaller and insignificant in the short run. The correlations increase in the medium and long run, and most of them become significant, especially when we measure cyclicality with respect to output. For example, corporate asset return correlations with consumption growth are under 20% at a one-quarter horizon, and increase to 30% at annual and lower frequencies. The asset return correlations with output growth are statistically and economically indistinguishable from 0 on quarterly frequency, and reach 46% at a 3-year horizon. These findings indicate that equity, bond, and total corporate asset valuations are exposed to economic growth risk, especially at low frequencies.

2.4 Robustness and Extensions

In this section we present a variety of checks to corroborate, expand, and sharpen our benchmark empirical results. We assess the contribution of the components of corporate assets, extend and economically interpret the findings for acyclicality of net issuances, present further evidence for the long-term behavior of payouts using spectral analysis, consider a global perspective, and provide additional robustness checks with respect to measurements and samples.

Components of corporate assets. We start by showing the relative importance of the components of corporate assets for the payout cyclicality. Specifically, we consider the contributions of insurance companies, financial sector, and IPOs for our main findings. Figure 8 summarizes the results for the cyclicality of adjusted corporate asset payouts with respect to consumption growth.

First, we exclude the insurance companies from the analysis. Barclays indices disaggregate corporate bond data by sectors, which allows us to take out the component of corporate bonds issued by the insurance companies. We further remove their debt due less than one year, commercial paper, and equity. Because we no longer face double counting regarding their holdings of corporate bonds, commercial paper, and equity, we no longer need to net them out from the aggregate quantities. On average, excluding the insurance companies increases our measure of the market value of total assets by 5.7% : reduction in bonds and equity issued by the insurance companies is more than offset by the inclusion of the corporate bonds they own. It does not have any impact on the cyclicality of the payouts: the correlations of the components of corporate asset payout change with consumption growth are very similar to the benchmark.

We then consider removing the financial sector all together. Similar to insurance companies, we remove corporate bonds issued by all the financials from the Barclays indices, take out their debt due in the current year, commercial paper, and equity. We no longer net out corporate assets held by the financial sector. Overall, excluding the financials lowers the market value of total assets by 12.5%. It decreases the correlations of cash corporate payouts with output growth, and has no material impact on the (a-)cyclicality of net issuances and total payouts on corporate assets.

Next, we examine the impact of changes in corporate structure and ownership of the firm, such as initial public offerings and mergers and acquisitions. Initial public offerings represent a transfer of ownership from private to public investors, and are counted in the equity issuance component of our corporate asset payouts. This is consistent with our aggregate strategy which calls for buying asset shares as soon as they become accessible through the regular financial markets. One could entertain an alternative and broader view that representative investor holds claims to all the companies, including private ones. In this case IPOs would amount to transfer of ownership within the representative agent family, and thus should not trigger issuance of new shares. Following this approach, one would need to measure valuations and payouts of private companies, and in addition, incorporate other nontradable forms of capital distributions to and from economic agents, such as deposits, mortgages, policy liabilities, etc. This exercise goes beyond the scope of our paper which focuses on investment in corporate (that is, publicly tradable) assets of the U.S. corporations. Nevertheless, we can still examine the role of the IPOs for our main findings. We drop new issuance of equity from our measurements. On average, this reduces measured equity issuances by 33%, but it has no impact on the cyclicality of corporate asset payouts and its net issuance components.

Our benchmark analysis accounts for mergers and acquisitions, such that a reduction in the market value of the target is offset by the actual share issuance or the price appreciation of the acquirer. Merger waves are known to be cyclical, so it is natural to ask how much this cyclicality drives our findings. We exclude mergers and acquisitions, and show the implications on Figure 8. Removing mergers reduces measured equity repurchases on average by 55.7%, and it actually makes the total asset payouts more countercyclical while making net issuances more procyclical.

Acyclicality of Net Issuances. Our evidence suggests that acyclicality of net issuances is responsible for the acylicality of total payouts, in spite of a strong procyclicality of cash payments. To help interpret the acyclicalilty of net issuances themselves, it is helpful to consider the issuances and repurchases components separately. This, however, requires individual firm data, which we can only obtain for equities from the CRSP Monthly Stock File. With this caveat in mind, we focus on the term structure of cyclicality for the equity payouts, and split the equity net issuances into issuances and repurchases.[16] Figure 9 shows the results for the benchmark sample from 1975 to 2017, while in Figure 10 we consider a longer sample which starts in 1949. The results from both samples are consistent with our main findings: cash payout growth rates are procyclical, especially in the long sample; changes in net issuances are acyclical, and total payout growth appears acyclical as well.

Interestingly, while changes in net issuances are acyclical, both of its components are quite procyclical in the data: the correlations of changes in issuances and repurchases with consumption growth are all positive. A potential explanation for these findings is that our measures aggregate across firms which may have different needs for capital. In good times,

[16]Following the literature, we attribute firm's net issuances to issuances (repurchases) if the number of shares outstanding increases (decreases) over the month, and aggregate the firm-level measures to aggregate index issuances and repurchases.

some firms in the cross-section face good investment opportunities and thus acquire more capital through issuances. Other firms may opt for the distribution of profits to the investors, which can be done either through cash dividends or through the repurchases. The repurchases may be the preferred form of distributing the transitory component of earnings, as dividend policy requires financial commitment (e.g., Lintner (1956)), consistent with the evidence in Dittmar and Dittmar (2004), Guay and Harford (2000), and Jagannathan, Stephens, and Weisbach (2000). In both cases, issuances and repurchases increase. This makes them procyclical separately, while on net basis the two effects offset each other, which leads to acyclical net issuances at the aggregate level.

Book versus market values. An important feature of our analysis is the reliance on market rather than book values to measure prices and payouts. Conceptually, stale book values of debt are inaccurate measures of its market value, especially for long-term bonds away from the issuance date. Using book values can lead to mis-measurements of the valuations and payouts on debt.

We use the Flow of Funds data, supplemented by the Compustat, to compute the book value quantities and compare them to the corresponding market-based ones. Similar to the benchmark analysis, we adjust for the cross-holdings of publicly traded liabilities and eliminate non-traded debt, subject to data limitations.

First, we find that market values of debt are quite distinct from book values. Changes in the market values are larger on average, more volatile, and have a correlation of only 45% with the book values.

Next, we consider the implications for debt payouts. We start with the cash component of the payouts which corresponds to interest payments. Changes in book and market-based cash payments, coming from the Flow of Funds and Barcalys Indices, respectively, align quite well: the correlation between the two series is 81% on an annual frequency. Book versus market approach should make no difference for recording the actual coupon payments, so a close correspondence between the two series provides a useful check for our calculations. On the other hand, net issuances are directly affected by bond valuations, and we find a substantial impact of using book versus market prices. Changes in market-valued net issuances are considerably more volatile than book values (3.78% versus 2.68%), and the correlation between the two is under 50%. This has a direct implication for the dynamics of total debt payouts, which inherit the properties of net issuances. Changes in market-based total debt payouts are more volatile than the book ones (3.54% versus 2.38%). The correlation between the two is 22%.

In terms of the cyclicality of the payouts, we find that the book-value evidence is consistent with our main results. Book-value debt cash payouts and net issuances remain procyclical, and total payouts on debt are mildly countercyclical.

Overall, the book value evidence corroborates our benchmark findings. However, given the conceptual issues in capturing bond prices by their book values, we prefer to utilize market-based approach to characterize the dynamics of the debt payouts and its components in the data.

Wavelet Analysis. The high volatility of acyclical net issuances makes it challenging to identify the risks associated with total payouts. To help uncover the long-run properties of the series, we perform a decomposition of the correlation between the payout changes and the economic growth using a discrete wavelet transform. Specifically, we estimate a sample wavelet correlation between the two on a scale by scale basis, where each scale is associated with specific frequency interval (e.g. the wavelet correlation for the wavelet scale 16 corresponds to periods of 32-64 quarters). In this part of the analysis we use quarterly growth rates adjusted by x12 ARIMA model which helps reduce the seasonality patterns in the data. All other computational details are provided in Appendix C.

In Table 4 we show the estimates of wavelet correlations at different frequencies and the associated 5% confidence interval. For cash payouts on equity, debt, and assets, a significant portion of their correlation with consumption is due to low frequency variation: for example, for assets, the wavelet correlation equals to 48% associated with period of 32-64 quarter, and 23% at 2-4 quarter frequency. The wavelet correlation for net issuances is statistically close to zero at both short and long frequencies. Finally, consistent with the benchmark evidence, the correlations for the total payouts are much lower than for the cash components, and are measured with a substantial noise.

Global Perspective. Our main results are conducted from the U.S. perspective and analyze the exposures to the economic risks in the U.S. consumption and output data. To the extent that investors are diversified in international markets, they may instead care about the exposures to global macroeconomic shocks. To confirm the robustness of our results, we construct several alternative measures of aggregate economic risks using the international macroeconomic data. We collect quarterly GDP data from major industrialized countries, and measure global output as a value-weighted GDP across countries. Alternatively, to reduce the impact of the U.S., we remove the U.S. from the GDP sample or use equal weights. Figure B.1 in the Appendix B shows the term structures of asset payout when we use global GDP to measure aggregate output. The results are very similar to the benchmark findings: growth rates in cash payouts are strongly procyclical, while growth rates in net issuances and total payouts are acyclical. For brevity, the Figure only reports the results for the total assets; our findings for equity and debt are very similar to the benchmark as well.

Alternative Samples and Measurements. We perform several other robustness checks to assess the validity of our results. Specifically, we consider: i) equity payouts in longer samples going back to 1949 or 1930; ii) using different sampling frequencies, such as annual growth rates at quarterly frequency, and seasonally adjusted quarterly growth rates either by band-pass, x12 ARIMA model, or by looking at year-to-year changes. The results reported in Table B.1-B.3 are consistent with our benchmark findings.

Finally, for our empirical analysis we use normalized changes in payouts to measure their growth rates, e.g. $\frac{\Delta D_{a,t}}{C_t} = \frac{D_{a,t}-D_{a,t-1}}{C_t}$. This is necessitated by the fact that payouts are often negative, and thus typical log growth computations can not be performed. For positive payouts our scaled change measure is very similar to a typical log growth rate. Indeed, up to a first-order approximation, the two growth rates are proportional: $\frac{\Delta D_t}{C_t} \approx \overline{\frac{D}{C}} \Delta \log D_t$. On Figure B.2, Appendix B, we plot changes in the cash payouts on equity, debt, and total assets against their corresponding log growth rates scaled by the average payout to consumption ratio. Visually, the scaled changes and log growth move nearly one-to-one, and the correlations between the two across the cash payouts measurements are in excess of 95%.

3 Model

Our novel empirical evidence suggests that total asset payout growth is acyclical at short and low frequencies. However, corporate assets demand a risk premium and are significantly exposed to economic growth risk, especially in the long run. To explain this puzzling empirical evidence, we argue that total assets payouts are dominated by acyclical net issuances which mask economic growth risk of the cash payouts. We develop a long-run risks valuation framework to quantitatively assess the plausibility of our economic explanation.

Independently, we make a methodological contribution to the literature by providing an alternative log-linearization framework of Campbell and Shiller (1988) to the cases with negative payouts.

3.1 Economic Setup

Preferences. We consider a discrete-time endowment economy, in a spirit of Bansal and Yaron (2004) and a subsequent long-run risks literature. The preferences of the representative agent over the future consumption stream are characterized by the Kreps and Porteus (1978) recursive utility of Epstein and Zin (1989) and Weil (1989):

$$U_t = \left[(1-\beta)C_t^{\frac{1-\gamma}{\theta}} + \beta(E_t U_{t+1}^{1-\gamma})^{\frac{1}{\theta}}\right]^{\frac{\theta}{1-\gamma}}, \tag{9}$$

where C_t is consumption, β is the subjective discount factor, γ is the risk-aversion coefficient, and ψ is the elasticity of intertemporal substitution (IES). For ease of notation, the parameter θ is defined as $\theta \equiv \frac{1-\gamma}{1-\frac{1}{\psi}}$. Note that when $\theta = 1$, that is, $\gamma = 1/\psi$, the recursive preferences collapse to the standard case of expected power utility, in which case the agent is indifferent to the timing of the resolution of uncertainty of the consumption path. When risk aversion exceeds the reciprocal of IES ($\gamma > 1/\psi$), the agent prefers early resolution of uncertainty of consumption path, otherwise, the agent has a preference for late resolution of uncertainty.

Epstein and Zin (1989) show that the asset pricing restriction for any asset return $r_{j,t+1}$ satisfies a standard Euler condition

$$E_t\left[exp\left\{m_{t+1} + r_{j,t+1}\right\}\right] = 1, \tag{10}$$

where m_{t+1} is the log of the intertemporal marginal rate of substitution (IMRS), defined as

$$m_{t+1} = \theta log\delta - \frac{\theta}{\psi}\triangle c_{t+1} + (\theta - 1)\, r_{c,t+1}. \tag{11}$$

$\Delta c_{t+1} = \log(C_{t+1}/C_t)$ is the log growth rate of aggregate consumption, and $r_{c,t}$ is a log return on the asset which delivers aggregate consumption as dividends (the wealth portfolio).

Consumption dynamics. As in Bansal and Yaron (2004), the consumption growth rate contains a small predictable component x_t which determines the conditional expectation of consumption growth, and the volatility of fundamental shocks is time-varying and is captured by the state variable σ_t^2 :

$$\triangle c_{t+1} = \mu_c + x_t + \sigma_t \eta_{t+1}, \tag{12}$$

$$x_{t+1} = \rho_x x_t + \varphi_x \sigma_t e_{t+1}, \tag{13}$$

$$\sigma_{t+1}^2 = \sigma_0^2 + \nu \left(\sigma_t^2 - \sigma_0^2\right) + \sigma_\omega \omega_{t+1}. \tag{14}$$

The parameters ρ_x and ν capture the persistence of the expected growth and volatility news, and σ_0, φ_x, and σ_w govern the unconditional scales of shocks to realized and expected consumption and consumption volatility, respectively.

Corporate sector payouts. To model the corporate sector, we focus on the total asset side of the balance sheet and provide a parsimonious exogenous specification for the cash and net issuances components of the aggregate asset payouts. For simplicity, we do not consider the issues of optimal capital structure and issuance and repurchase decisions, and leave these model extensions for future research.

Following Hansen, Heaton, and Li (2008), Bansal and Yaron (2007) and Bansal, Dittmar, and Lundblad (2005), cash payouts are co-integrated in logs with the consumption level:

$$\log\left(\frac{D_t}{C_t}\right) \equiv s_t. \tag{15}$$

The co-integrating residual s_t is stationary, persistent, and is exposed to the low-frequency growth risk:

$$s_{t+1} = \mu_s + \rho_s \left(s_t - \mu_s\right) + \phi_s x_t + \varphi_s \sigma_t u_{t+1}. \tag{16}$$

Parameters μ_s, ρ_s, and φ_s determine the unconditional level, persistence, and the volatility of the cash payout dynamics, and ϕ_x govern the sensitivity to the expected growth risks.

To accommodate net issuances, we first define the adjusted net issuance H_t as

$$H_t \equiv C_t + NI_t = C_t + ISS_t - REP_t. \tag{17}$$

Economically, we expect the adjusted net issuances to be always positive: the repurchase component of net issuances is a capital distribution from firms to investors, supplemental to cash dividends and coupons, all of which are used to finance consumption expenditures.

Hence, even ignoring issuances, we expect $C_t > REP_t$, and therefore $H_t > 0$.[17] Then, we assume that the log of the adjusted net issuances to consumption is driven by i.i.d. shocks:

$$\log \frac{H_t}{C_t} = \mu_h + \varphi_h \sigma_t \varepsilon_t, \tag{18}$$

where μ_h and φ_h capture the unconditional level and volatility of the net issuances. Unlike cash flows, net issuances are not directly exposed to low-frequency fluctuations in economic growth. Further, different from the cash flow dynamics, the process for net issuances is specified in levels and not in logs, because they can be negative.[18]

The four shocks $\eta_{t+1}, e_{t+1}, \omega_{t+1}$ and ε_{t+1} are $i.i.d$ standard Normal. We allow for the correlation between the transitory shocks to consumption growth and cash payout growth:

$$Cov\left(\eta_{t+1}, u_{t+1}\right) = \alpha. \tag{19}$$

3.2 Model Solution

For tractability, we consider an approximate solution to the model based on the log-linearization of the consumption and asset return.

Valuation of consumption claim and the IMRS. The log-linearization of the consumption return is standard and follows from Campbell and Shiller (1988). Specifically,

$$r_{c,t+1} = \log\left(\frac{V_{c,t+1} + C_{t+1}}{V_{c,t}}\right) \approx \kappa_{0,c} + \kappa_{1,c} vc_{c,t+1} + \Delta c_{t+1} - vc_{c,t}, \tag{20}$$

where $vc_{c,t} = log\left(\frac{V_{c,t}}{C_t}\right)$ is the valuation of the consumption claim, and $\kappa_{0,c}$ and $\kappa_{1,c}$ are the linearization coefficients which are determined in equilibrium by the unconditional level of the consumption asset valuation. Under the log-linearized consumption return, the value of the consumption claim, the consumption return, and hence, the stochastic discount factor are linear in the underlying states of the economy, and can be solved in a closed form. As

[17] This is also strongly supported by the data. In our sample, equity repurchases are on average below 10% and never exceed 40% of the level of consumption. Adding issuances, the issuances net of repurchases never fall below 15% of the total consumption at equity, debt, or asset levels.

[18] Our approach is different from Boudoukh, Michaely, Richardson, and Roberts (2007) who add a constant to net yield to make it positive. Adjusting net issuances by the level of consumption allows us to impose co-integration between the key aggregate quantities while guaranteeing positivity of adjusted net issuances.

shown in Appendix D and elsewhere in the literature, the value of the consumption claim is given by:

$$vc_{c,t} = A_{0,c} + A_{1,c}x_t + A_{2,c}\sigma_t^2, \tag{21}$$

and the equilibrium log stochastic discount factor satisfies,

$$m_{t+1} = m_0 + m_x x_t + m_\sigma \sigma_t^2 - \lambda_\eta \sigma_t \eta_{t+1} - \lambda_e \varphi_e \sigma_t e_{t+1} - \lambda_w \sigma_w \omega_{t+1}, \tag{22}$$

The exposures of the consumption asset and the market prices of risks are pinned down by the model and preference parameters, and are provided in Appendix D. The economic content of the long-run risks model is that when agents have a preference for timing of uncertainty resolution, the short-run, long-run, and volatility risks (η, e, and ω, respectively) are priced, and determine the risk compensation in asset markets. Specifically, for $\gamma > 1$ and $\psi > 1$, the consumption claim requires a positive risk premium because the consumption asset return is low in bad times of low realized or expected consumption growth ($\lambda_\eta, \lambda_e > 0$ and $A_{1,c} > 0$), or high consumption volatility ($\lambda_w < 0$ and $A_{2,c} < 0$). Quantitatively, the risk premium is dominated by the compensations for the expected consumption and volatility risks, which are magnified due to a large persistence of these shocks.

Valuation of corporate assets. The payouts from the corporate sector are determined by the cash and net issuance components in (15) and (18), respectively. Notably, unlike for typical consumption and dividend claims, these payouts can be negative when firms need capital and issue a large amount of equity or debt. Hence, we can not use a standard Campbell and Shiller (1988) approximation, and derive an alternative approach to log-linearize the return. We rewrite the return on the corporate assets in (2) as follows:

$$\begin{aligned}
1 + R_{d,t+1} &= \frac{V_{d,t+1} + D_{t+1} - NI_t}{V_{d,t}} \\
&= \frac{V_{d,t+1} + D_{t+1} + C_{t+1} - H_{t+1}}{V_{d,t}} \\
&= \frac{C_{t+1}}{C_t} \cdot \frac{1 + \frac{V_{d,t+1}}{C_{t+1}} + \frac{D_{t+1}}{C_{t+1}} - \frac{H_{t+1}}{C_{t+1}}}{\frac{V_{d,t}}{C_t}},
\end{aligned}$$

where $V_{d,t}$ is the value of the asset. Notably, all the ratios in the last equation are positive: consumption, prices, cash payouts, and adjusted net issuances are all above zero. We can then log-linearize the expression above around the unconditional log values of $\overline{vc}_d, \overline{dc}$ and $\overline{hc}$

to derive the log-linear approximation for the asset return:

$$r_{d,t+1} \approx \kappa_{0,d} + \kappa_{1,d} vc_{d,t+1} + \Delta c_{t+1} + \kappa_{2,d} dc_{t+1} + \kappa_{3,d} hc_{t+1} - vc_{d,t}, \tag{23}$$

where $vc_{d,t} = log\left(\frac{V_{d,t}}{C_t}\right)$ is the log asset value to consumption ratio, $dc_t = log\left(\frac{D_t}{C_t}\right)$ is the log ratio of the asset cash payouts to consumption, and $hc_t = log\left(\frac{H_t}{C_t}\right)$ is the ratio of the net issuance to consumption. The expressions for the log-linearization coefficients κ are provided in the Appendix D.

Our log-linear approximation in (23) nests a standard one for the consumption asset in (20). Indeed, when there are no net issuances and cash payouts are equal to consumption, then $hc_t = dc_t = 0$. When net issuances are part of the payouts, the total payout can now be negative and can no longer be used to scale valuations and define growth rates. This is why we have to switch to consumption to scale all the quantities, and rewrite the payouts in terms of positive cash and the adjusted net issuance components. Finally, our approach is also different from the linearizations in Larrain and Yogo (2008) and Bansal and Yaron (2007). These papers effectively log-linearize the returns around the positive issuance and repurchase components of the net issuances. The disadvantage of this method is that it requires modeling issuances and repurchases separately. Recall that due to the data limitations, we can not separate the issuances and repurchases at the asset level, and thus prefer modeling the issuances net of repurchases directly.

Using our log-linearization solution to asset returns in (23), we can now use the corporate payout dynamics in (15)-(18) and the equilibrium stochastic discount factor in (22) to solve for the equilibrium asset valuations. The corporate valuations are linear in the economic states:

$$vc_{d,t} = A_{0,d} + A_{1,d} x_t + A_{2,d} \sigma_t^2 + A_{3,d} s_t. \tag{24}$$

Similar to the consumption asset, for typical model parameters corporate assets are risky: they fall in bad times of low economic growth ($A_{1,d} > 0$) or high consumption volatility ($A_{2,d} < 0$). The asset prices also increase at times of a positive gap between cash payouts and consumption ($A_{3,d} > 0$): because the gap s_t is persistent, it signifies higher cash payments to investors in the future.

3.3 Implications for Payouts and Valuations

We calibrate the model, and assess whether it can quantitatively account for our empirical evidence. As is common in this literature, we calibrate the model at a monthly frequency, and use simulations to target the data at an annual horizon. Specifically, we time-aggregate the simulated monthly output from the model and construct annual growth rates and payout changes, asset returns, and valuation ratios. We report the median and percentiles for the model statistics based on $10,000$ Monte-Carlo simulations with 40×12 monthly observations each that match the length of the historical data. We also show the population values that correspond to a long-sample of 10,000 annualized observations.

Consumption and corporate payouts. Table 5 reports the parameter values for the model. In a spirit of the long-run risks literature, the consumption calibration features persistent low-frequency movements in the expected growth and consumption volatility. The persistence of the expected growth component is set at 0.985, and that of the volatility shocks at 0.999. The scales of the expected growth and volatility shocks are rather small to account for the empirical properties of the macroeconomic fundamentals in the data.

Table 6 shows that our model can match salient properties of the consumption data. The Table reports the mean, standard deviation, and the persistence of the consumption growth at 1,2 and 5 lags in the data and in the model. The data moments are computed for the benchmark 1975-2017 sample, as well as for a long sample going back to 1929. The median model values are close to the data, and in all the cases the data values are within the confidence interval of the model.

We next calibrate the dynamics of the cash payouts and net issuances. The cash payouts are moderately persistent ($\rho_s = 0.96$) and are exposed to the expected growth fluctuations ($\phi_s = 6$). Recall that in the model the ratio of net issuances to consumption is unpredictable and driven by its own i.i.d. shock, so we only need to set its overall level and scale. As shown in Table 7, the model can successfully capture the key moments of cash payout, net issuance, and total payout dynamics in the data. Changes in net issuances are several times more volatile that changes in cash payouts. This leads to a highly volatile total asset payout growth dominated by shocks to net issuance. Its volatility of 4.72 is comparable to 4.33 in the model. The Table also shows that, unlike cash dividends which are always positive, net issuances and total payouts can go negative. In the model, net issuances become negative about 5% of the time, while total payouts turn negative 25% of the time. These estimates are consistent with the data.

Changes in annual cash payouts are mildly persistent both in the model and the data. Changes in net issuances actually have a negative persistence in the data. This is also captured by the model structure because i.i.d. shocks to the levels of net issuances lead to negative autocorrelation for the changes. Changes in total payouts behave like net issuances, and have a negative persistence both in the data and in the model. The Table also shows that the model can capture well the short-run cyclicality evidence in the data. Cash payouts are positively correlated with annual consumption growth: the correlation is 0.38 in the data and 0.33 in the model. Net issuances are acyclical, and total payouts are essentially acyclical as well: their correlation with consumption growth -0.06 in the data relative to 0.03 in the model. The confidence intervals on the asset payout correlations are quite large, which is consistent with the idea that the net issuances introduce a substantial noise in measuring the exposures of aggregate payouts to economic risks.

Perhaps surprisingly, the model does not match exactly the mean of net issuances and aggregate payouts, even though these are effectively governed by the exogenous parameters in the model (the data value is well within the 5% confidence interval of the model). The unconditional mean of net issuance changes in the model is positive, while it is essentially zero in the data. A sufficiently high mean of total asset payouts is required by the model to guarantee positivity of prices. Because there is a substantial statistical uncertainty about the estimates of the mean, we instead target a lower value for the average net issuances below the estimate in the data. Under these parameter values, the present value of total payouts is positive.[19]

Asset prices and economic risk. To study the implications for the asset prices, we calibrate the preference parameters to standard values in the literature. The risk aversion is set at 10, and the IES parameter is 1.5. This configuration implies a preference for early resolution of uncertainty and a strong substitution effect. These margins play an important role to generate sizeable risk compensations and realistic dynamics of the asset prices (see Bansal and Yaron (2004)).

[19]Asset payouts which are positive on average is a necessary but not a sufficient condition for the convergence and positivity of asset valuations. Due to aggregate risk compensation, states with negative payouts in general contribute more to total asset valuations than states with positive payouts. This places further discipline on the payout parameters to ensure that economically plausible solution to asset prices exists.

Table 8 shows the model implications for the key asset-pricing moments, such as the mean and standard deviation of the risk-free rate and the asset return. The model replicates quite well a relatively low level and volatility of the risk-free rate in the data. The level is 0.79% in the data relative to 1.64% in the model, and its volatility is 1.75% in the data and 0.81% in the model. The asset returns are risky: the asset risk premium is 6.95% in the data relative to 6.18% in the model, and the asset return volatility is about 12% both in the model and in the data.

What is the nature and sources of risk in corporate assets? The key source of risk in our economy is the news to the expected consumption growth, which accounts for about a half of the compensation for the total asset risk premium, with volatility and short-run consumption risks explaining the rest. This expected growth risk compensation reflects the exposure of the cash component of the aggregate payouts to low-frequency fluctuations in expected consumption through the parameter φ_s. Indeed, zeroing out net issuance components from the total payouts by setting $\varphi_h = 0$ does not materially affect the model implied asset risk premium.[20]

The term structures of cyclicality help further assess and validate the expected growth risk channel for the payouts and valuations. As shown in Figure 11, asset returns co-move positively with consumption growth at short and long horizons in the data, and the model can quantitatively capture these correlations. The model also replicates very well the correlation patterns across different components of the payouts and at different frequencies. Both in the data and in the model, the cash payouts are procyclical at all horizons, while the net issuances and total payouts are effectively acyclical. The correlations are very similar in the model and in the data.

Hence, even though corporate payouts are dominated by shocks to net issuances which are uncorrelated with the aggregate economy, the large exposure of cash payouts to low-frequency growth fluctuations makes total payouts risky, and generates a large risk premium for asset returns.

[20] The volatility of net issuances is exposed to consumption volatility, so that net issuances affect the asset exposure to the volatility risks. Net issuances also impact the values of the steady states for the log-linearization of returns. These effects are quite small.

4 Conclusions

We measure the market value of U.S. corporate assets and their payouts to investors. Our measure of total payout includes not only the cash dividends and interest payments (cash payouts), but also net transfers in the form of repurchases and new issuances of equity and debt.

We document several novel empirical findings. First, total asset payouts often turn negative, meaning that there are periods when investors finance the corporate sector. Second, net issuances are highly volatile, and are a dominant component of the total payouts. Third, while cash payouts are procyclical, total payouts appear acyclical. This holds for equity, debt and especially for asset payouts. This evidence challenges standard notions of risk and return, because asset returns are risky and comparable to equities.

We develop a long-run risk model to account for the empirical evidence. In the model, net issuances are acyclical and highly volatile, which masks the exposure of cash components of total payouts to low frequency economic risks. The model matches acyclical dynamics of the total payout, while generating a sizeable asset risk premium.

There are several extensions of our paper that would be fruitful to pursue in future work. On the empirical side, it would be interesting to consider properties of the valuations and payouts across firms, and not just at the aggregate level. Theoretically, it would be useful to develop an economic model which endogenizes the payout decisions. As a next step, one can calibrate or estimate the economic environment and quantify the role of economic risks for payout policy and asset valuations. We leave these extensions for future research.

Appendix

A Barclays Index Data

Table A.1: **Barclays Index Data**

Index	**Start Date**	**Quality**	**Minimum Issue Size**	**Minimum Maturity (or Average Life)**	**Size ($billion)** Dec-2014
			Long-Term Debt Components:		
U.S. Corporate IG	Jan-73	IG	$250 m	1 year	$ 3,892
U.S. Corporate HY	Jan-83	HY	$150 m	1 year	$ 1,311
U.S. 144a Ex-Aggregate	Feb-98	IG	$250 m	1 year	$ 1,287
U.S. Commercial MBS	Jun-99	IG, HY	$250 m	1 year	$ 390
U.S. Fixed-Rate ABS	Jan-92	IG	$500m Deal Size $25m Tranche Size	1 year	$ 96
U.S. Tax-Exempt Municipals	Jan-73	IG	$250 m	1 year	$ 42
U.S. Convertibles Composite	Jan-03	IG, HY	$250 m	1 month	$ 220
			Short-Term Debt Components:		
U.S. Floating-Rate ABS	May-05	IG	$500m Deal Size $25m Tranche Size	1 year	$ 109
U.S. Floating Rate Notes	Oct-03	IG	$300 m	1 month (13 months prior Apr-07)	$ 278
U.S. Floating Rate Notes HY	March-06	HY	$150 m	1 year	$ 6

B Cyclical Properties of Payouts: Robustness

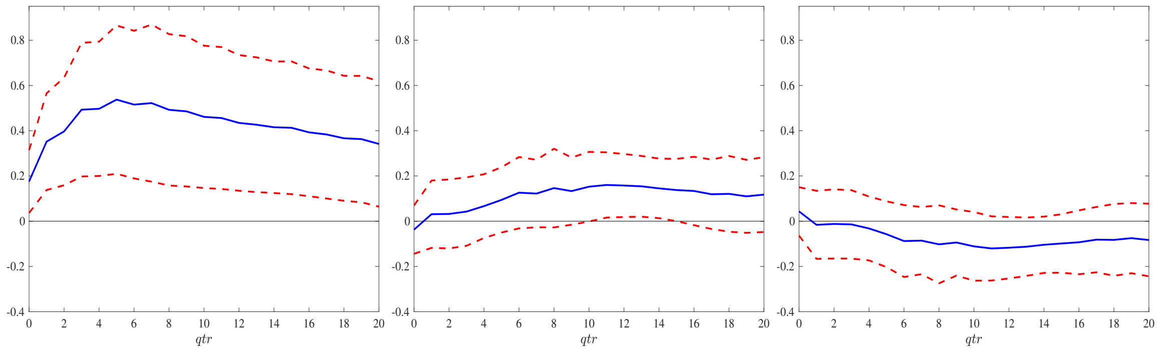
Figure B.1 shows the term structure of asset payout cyclicality based on value-weighted global GDP, value-weighted global GDP excluding the United States, and equal-weighted global GDP. To compute global GDP, we use the OECD quarterly output data for 17 major industrialized countries, such as the United States, Canada, France, Germany, Italy, Japan, the United Kingdom, Australia, Belgium, Denmark, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, and Switzerland.

We perform a variety of checks to assess the robustness of our payout cyclicality results. Specifically, in addition to the benchmark sample from 1975 to 2017, we consider shorter sample which stops in 2006 before the Financial Crisis, as well as the most recent sample from 2007 to 2017. For equity data, we also provide the results for the 1949-2017 and 1949-2006 samples. The benchmark results are based on the changes in annual payouts sampled at annual frequency. To extend the sample size, we consider sampling the data at quarterly frequency. First, we consider changes in annual payouts (that is, the payouts over the past four quarters relative to the payouts over the same four quarters in the previous year), sampled at quarterly frequency. Next, we look at changes in quarterly payouts, which are seasonally adjusted through the band-pass filter or the X-12 ARIMA filter. Finally, we consider year-to-year changes in quarterly payouts (that is, quarterly payouts this year relative to the payout in the same quarter in a previous year), again sampled at quarterly frequency. The results are consistent across all the specifications, and show that cash payouts are generally procyclical, while changes in net issuances and total payouts seem acyclical to mildly counter-cyclical.

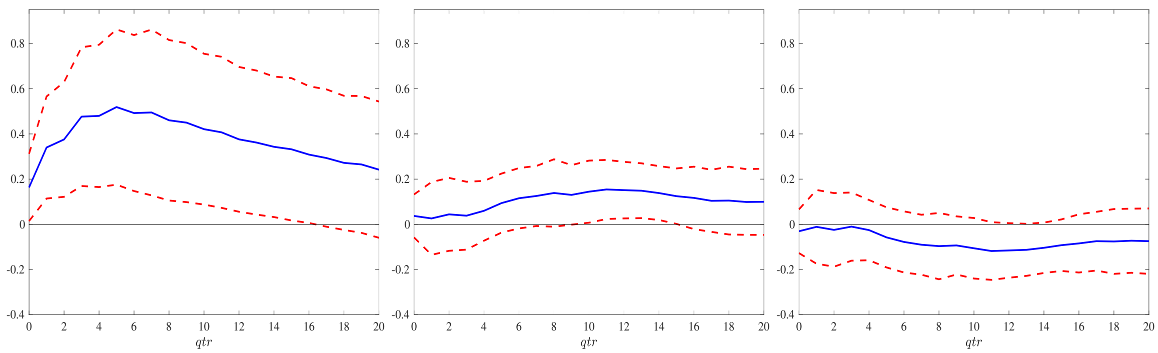
Figure B.1: **Term structure of Asset Payout Cyclicality: Global Risks**

a) Value-Weighted Global GDP

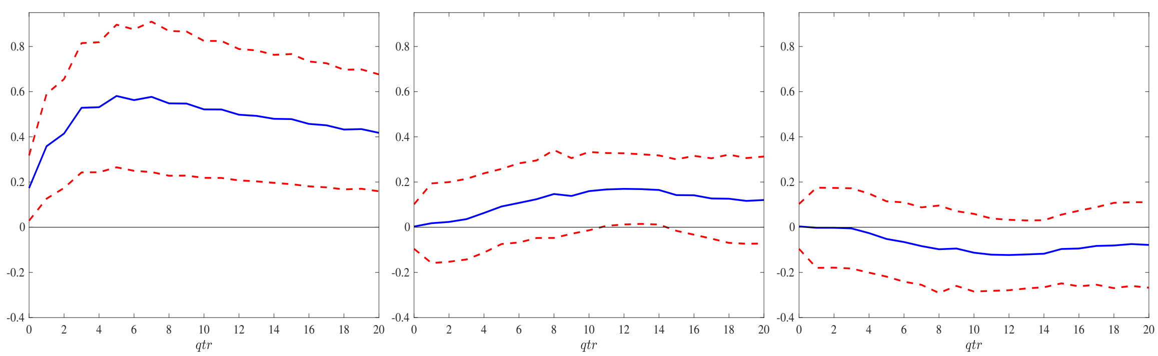
Cash Payout **Net Issuance** **Total Payout**



b) Value-Weighted Global GDP, excluding US



c) Equal-Weighted Global GDP



The Figure shows multi-horizon correlations between changes in total asset payouts, scaled by the global output level, and measures of global output growth. The left panel shows the results for the cash payouts, the middle panel is for the net issuances, and the right panel plots the correlations for the total payouts. Measures of global output include value-weighted GDP, value-weighted GDP excluding the U.S., and equally-weighted GDP. The data are real quarterly observations, sampled on a quarterly frequency and from Q1.1975 to Q4.2017.

Table B.1: **Equity Payout Cyclicality**

$Corr\,(\cdot, \Delta c_t)$	$\frac{\Delta D_t}{C_t}$	$\frac{\Delta NI_t}{C_t}$	$\frac{\Delta ISS_t}{C_t}$	$\frac{\Delta REP_t}{C_t}$	$\frac{\Delta D_{a,t}}{C_t}$
			Sample 1949-2017:		
Annual change	0.18	0.13	0.19	0.17	-0.12
Quarterly change, band-passed	0.26	0.21	0.24	0.11	-0.20
Quarterly change, x12 ARIMA	0.18	0.07	0.11	0.11	-0.07
Quarterly change, year-to-year	0.27	0.11	0.17	0.15	-0.10
			Sample 1949-2006:		
Annual change	0.14	0.19	0.22	0.13	-0.19
Quarterly change, band-passed	0.20	0.26	0.28	0.14	-0.25
Quarterly change, x12 ARIMA	0.19	0.12	0.13	0.04	-0.12
Quarterly change, year-to-year	0.29	0.16	0.19	0.10	-0.15
			Sample 1975-2017:		
Annual change	0.21	-0.12	0.08	0.26	0.13
Quarterly change, band-passed	0.27	0.01	0.10	0.16	0.00
Quarterly change, x12 ARIMA	0.17	-0.03	0.05	0.17	0.04
Quarterly change, year-to-year	0.22	-0.05	0.12	0.22	0.06
			Sample 1975-2006:		
Annual change	0.16	-0.06	0.09	0.23	0.07
Quarterly change, band-passed	0.03	0.11	0.19	0.19	-0.11
Quarterly change, x12 ARIMA	0.18	0.05	0.09	0.09	-0.04
Quarterly change, year-to-year	0.20	0.04	0.14	0.16	-0.03
			Sample 2007-2017:		
Annual change	0.42	-0.34	-0.13	0.27	0.37
Quarterly change, band-passed	0.35	-0.13	-0.41	-0.31	0.15
Quarterly change, x12 ARIMA	0.20	-0.28	-0.16	0.29	0.28
Quarterly change, year-to-year	0.41	-0.41	-0.05	0.43	0.43

The Table reports correlations between changes in the equity payouts, scaled by the consumption level, and consumption growth. The equity payouts include cash payouts, net issuances, issuances, repurchases, and total payouts. Payouts are sampled at quarterly frequency, and are either annual or quarterly, seasonally adjusted through a band-pass filter, X12-ARIMA filter, or by computing year-to-year changes.

Table B.2: **Debt Payout Cyclicality**

$Corr\,(\cdot, \Delta c_t)$	$\frac{\Delta D_t}{C_t}$	$\frac{\Delta NI_t}{C_t}$	$\frac{\Delta D_{a,t}}{C_t}$
	Sample 1975-2017:		
Annual change	0.22	0.06	-0.04
Quarterly change, band-passed	0.23	0.09	-0.08
Quarterly change, x12 ARIMA	0.14	0.07	-0.05
Quarterly change, year-to-year	0.23	0.10	-0.09
	Sample 1975-2006:		
Annual change	0.07	0.04	-0.04
Quarterly change, band-passed	-0.01	0.06	-0.06
Quarterly change, x12 ARIMA	-0.01	0.07	-0.07
Quarterly change, year-to-year	-0.01	0.05	-0.05
	Sample 2007-2017:		
Annual change	0.32	0.03	0.01
Quarterly change, band-passed	0.32	0.06	-0.04
Quarterly change, x12 ARIMA	0.35	-0.05	0.09
Quarterly change, year-to-year	0.56	0.26	-0.23

The Table reports correlations between changes in debt payouts, scaled by the consumption level, and consumption growth. The debt payouts include cash payouts, net issuances, and total payouts. Payouts are sampled at quarterly frequency, and are either annual or quarterly, seasonally adjusted through a band-pass filter, X12-ARIMA filter, or by computing year-to-year changes.

Table B.3: **Asset Payout Cyclicality**

$Corr\left(\cdot, \Delta c_t\right)$	$\frac{\Delta D_t}{C_t}$	$\frac{\Delta NI_t}{C_t}$	$\frac{\Delta D_{a,t}}{C_t}$
	Sample 1975-2017:		
Annual change	0.27	-0.03	0.06
Quarterly change, band-passed	0.32	0.04	-0.02
Quarterly change, x12 ARIMA	0.23	0.00	0.01
Quarterly change, year-to-year	0.29	0.05	-0.04
	Sample 1975-2006:		
Annual change	0.15	0.02	-0.01
Quarterly change, band-passed	0.02	0.12	-0.12
Quarterly change, x12 ARIMA	0.11	0.06	-0.05
Quarterly change, year-to-year	0.12	0.07	-0.07
	Sample 2007-2017:		
Annual change	0.41	-0.31	0.39
Quarterly change, band-passed	0.41	-0.04	0.07
Quarterly change, x12 ARIMA	0.37	-0.26	0.31
Quarterly change, year-to-year	0.57	-0.09	0.16

The Table reports correlations between changes in asset payouts, scaled by the consumption level, and consumption growth. The asset payouts include cash payouts, net issuances, and total payouts. Payouts are sampled at quarterly frequency, and are either annual or quarterly, seasonally adjusted through a band-pass filter, X12-ARIMA filter, or by computing year-to-year changes.

Figure B.2: **Normalized Changes versus Log Growth Rate**

The Figure shows changes in total cash payouts scaled by the consumption level (solid line) or the log growth rates in cash payouts scaled by the average ratio of cash payouts to the consumption level (dashed line). The data are real annual observations from 1975 to 2017.

C Wavelet Analysis

The wavelet correlation between two stochastic processes x and y for scale $\lambda_j = 2^{j-1}$ equals to

$$\rho_{xy}(\lambda_j) = \frac{Cov\left(\overline{W}_{j,t}^{(x)}, \overline{W}_{j,t}^{(y)}\right)}{\left\{Var\left(\overline{W}_{j,t}^{(x)}\right) Var\left(\overline{W}_{j,t}^{(y)}\right)\right\}^{\frac{1}{2}}},$$

where $\overline{W}_{j,t}^{(x)}$ and $\overline{W}_{j,t}^{(y)}$ are the scale λ_j maximal overlap discrete wavelet transform (MODWT) coefficients for x and y, respectively. Since this is just a correlation coefficient between two random variables on a scale by scale basis, $-1 \geq \rho_{xy}(\lambda_j) \leq 1$ for all j. The MODWT coefficient for a stochastic process u is defined as

$$\overline{W}_{j,t}^{(u)} = \sum_{l=0}^{L_j-1} \tilde{h}_{j,l} u_{t-l},$$

where $\left\{\tilde{h}_{j,0}, ..., \tilde{h}_{j,L_j-1}\right\}$ are the wavelet filter coefficients from a Daubechies compactly supported wavelet family, with $L_j = (2^j - 1)(L-1) + 1$.

We estimate the sample wavelet correlation by simply using the estimators of wavelet covariance and wavelet variance, respectively,

$$\hat{\gamma}_{xy}(\lambda_j) = \frac{1}{T_j} \sum_{t=L_j-1}^{T-1} \overline{W}_{j,t}^{(x)} \overline{W}_{j,t}^{(y)} \qquad \& \qquad \hat{\nu}_x^2(\lambda_j) = \frac{1}{T_j} \sum_{t=L_j-1}^{T-1} \left(\overline{W}_{j,t}^{(x)}\right)^2,$$

with $T_j = T - L_j + 1$.

Whitcher, Guttorp, and Percival (2000) establish a central limit theorem for the estimator of wavelet correlation,

$$\hat{\rho}_{xy}(\lambda_j) = \frac{\hat{\gamma}_{xy}(\lambda_j)}{\hat{\nu}_x(\lambda_j)\,\hat{\nu}_y(\lambda_j)},$$

and construct an approximate confidence interval (CI). An approximate $100(1-2p)\,\%$ CI for $\rho_{xy}(\lambda_j)$ is given by

$$tanh\left\{tanh^{-1}(\hat{\rho}_{xy}(\lambda_j)) \pm \frac{\Phi^{-1}(1-p)}{\sqrt{T_j - L_j' - 3}}\right\},$$

with $L'_j = (L-2)\left(1-2^{-j}\right)$.

D Model Solution

The equilibrium consumption claim loadings are given by

$$\begin{aligned}
A_{0,c} &= \frac{1}{1-\kappa_{1,c}}\left(log\left(\delta\right) + \left(1-\frac{1}{\psi}\right)\mu_c + \kappa_{0,c} + \kappa_{1,c}A_{2,c}\left(1-\nu\right)\sigma_0^2 + \frac{\theta}{2}\left(\kappa_{1,c}A_{2,c}\sigma_\omega\right)^2\right), \\
A_{1,c} &= \frac{1-\frac{1}{\psi}}{1-\kappa_{1,c}\rho_x}, \\
A_{2,c} &= -\frac{\left(1-\frac{1}{\psi}\right)\left(\gamma-1\right)}{2\left(1-\kappa_{1,c}\nu\right)}\left(1+\left(\frac{\kappa_{1,c}\varphi_x}{1-\kappa_{1,c}\rho_x}\right)^2\right).
\end{aligned}$$

The market prices of risks are,

$$\begin{aligned}
\lambda_\eta &= \gamma, \\
\lambda_e &= -\left(\theta-1\right)\kappa_{1,c}A_{1,c}\varphi_x, \\
\lambda_\omega &= -\left(\theta-1\right)\kappa_{1,c}A_{2,c}.
\end{aligned}$$

The log-linearization coefficients for the corporate asset satisfy,

$$\begin{aligned}
\kappa_{0,d} &= log\left(1+exp\left\{\overline{vc}_d\right\}+exp\left\{\overline{dc}\right\}-exp\left\{\overline{hc}\right\}\right) - \kappa_{1,d}\overline{vc}_d - \kappa_{2,d}\overline{dc} - \kappa_{3,d}\overline{hc}, \\
\kappa_{1,d} &= \frac{exp\left\{\overline{vc}_d\right\}}{1+exp\left\{\overline{vc}_d\right\}+exp\left\{\overline{dc}\right\}-exp\left\{\overline{hc}\right\}}, \\
\kappa_{2,d} &= \frac{exp\left\{\overline{dc}\right\}}{1+exp\left\{\overline{vc}_d\right\}+exp\left\{\overline{dc}\right\}-exp\left\{\overline{hc}\right\}}, \\
\kappa_{3,d} &= -\frac{exp\left\{\overline{hc}\right\}}{1+exp\left\{\overline{vc}_d\right\}+exp\left\{\overline{dc}\right\}-exp\left\{\overline{hc}\right\}}.
\end{aligned}$$

The loadings for the corporate claim are given by,

$$
\begin{aligned}
A_{0,d} &= \frac{1}{1-\kappa_{1,d}}\left(m_0 + \mu_c + \kappa_{0,d} + \kappa_{1,d}A_{2,d}\left(1-\nu\right)\sigma_0^2 + \left(\kappa_{1,d}A_{3,d} + \kappa_{2,d}\right)\mu_s\left(1-\rho_s\right) + \ldots\right.\\
&\quad\left. + \kappa_{3,d}\mu_h + 0.5\left(\kappa_{1,d}A_{2,d} - \lambda_\omega\right)^2\sigma_\omega^2\right),\\
A_{1,d} &= \frac{1}{1-\kappa_{1,d}\rho_x}\left(\left(1-\frac{1}{\psi}\right) + \frac{\kappa_{2,d}\phi_s}{1-\kappa_{1,d}\rho_s}\right),\\
A_{2,d} &= \frac{1}{1-\kappa_{1,d}\nu}\left(m_2 + 0.5\left(\left(1-\lambda_\eta\right)^2 + \left(\kappa_{1,d}A_{1,d}\varphi_x - \lambda_e\right)^2 + \ldots\right.\right.\\
&\quad\left.\left. + \left(\kappa_{1,d}A_{3,d} + \kappa_{2,d}\right)^2\varphi_s^2 + 2\alpha\left(1-\lambda_\eta\right)\left(\kappa_{1,d}A_{3,d} + \kappa_{2,d}\right)\varphi_s + \kappa_{3,d}^2\varphi_h^2\right)\right),\\
A_{3,d} &= \frac{\kappa_{2,d}\rho_s}{1-\kappa_{1,d}\rho_s}.
\end{aligned}
$$

References

Bansal, Ravi, Robert F Dittmar, and Christian T Lundblad, 2005, Consumption, dividends, and the cross section of equity returns, *The Journal of Finance* 60, 1639–1672.

Bansal, Ravi, and Amir Yaron, 2004, Risks for the long run: A potential resolution of asset pricing puzzles, *The Journal of Finance* 59, 1481–1509.

Bansal, Rav, and Amiri Yaron, 2007, The Asset Pricing Macro Nexus and Return Cash-Flow Predictability, in *2007 Meeting Papers* no. 18. Society for Economic Dynamics.

Barro, Robert, 2006, Rare Disasters and Asset Markets in the Twentieth Century, *Quarterly Journal of Economics* 121.

Bernanke, Ben, and John Campbell, 1988, Is There a Corporate Debt Crisis?, *Brookings Papers on Economic Activity* 19, 83–140.

Bhamra, Harjoat, Lars-Alexander Kuehn, and Ilya Strebulaev, 2010, The Levered Equity Risk Premium and Credit Spreads: A Unified Framework, *Review of Financial Studies* 23, 645–703.

Boudoukh, Jacob, Roni Michaely, Matthew Richardson, and Michael R Roberts, 2007, On the importance of measuring payout yield: Implications for empirical asset pricing, *The Journal of Finance* 62, 877–915.

Brainard, William C., and John B. Shoven, 1980, The financial valuation of the return to capital, *Brookings Papers on Economic Activity* pp. 453–511.

Campbell, John, and John Cochrane, 1999, By Force of Habit: A Consumption-Based Explanation of Aggregate Stock Market Behavior, *Journal of Political Economy* 107, 205–251.

Campbell, John Y, and Robert J Shiller, 1988, The dividend-price ratio and expectations of future dividends and discount factors, *Review of financial studies* 1, 195–228.

Chen, Hui, 2010, Macroeconomic Conditions and the Puzzles of Credit Spreads and Capital Structure, *Journal of Finance* 65, 2171–212.

Choi, J., and M. Richardson, 2016, The volatility of a firm's assets and the leverage effect, *Journal of Financial Economics* 121, 254–277.

Croce, Mariano M., 2014, Long-Run Productivity Risk. A New Hope for Production-Based Asset Pricing?, *Journal of Monetary Economics* 66, 13–31.

Dittmar, A., and R. Dittmar, 2004, Stock Repurchase Waves: An Explanation of the Trends in Aggregate Corporate Payout Policy, Working paper.

Epstein, Larry G, and Stanley E Zin, 1989, Substitution, risk aversion, and the temporal behavior of consumption and asset returns: A theoretical framework, *Econometrica: Journal of the Econometric Society* pp. 937–969.

Fama, Eugene, and Kenneth French, 2001, Disappearing dividends: Changing firm characteristics or lower propensity to pay?, *Journal of Financial Economics* 60, 3–43.

Ferson, Wayne, Suresh Nallareddy, and Biqin Xie, 2013, The 'out of sample' Performance of Long-run Risk Models, *Journal of Financial Economics* 107, 537–56.

Gomes, J., M. Kilic, and S. Plante, 2018, Debt Overhang and Investment: The Case of Gold Clauses in the 1930s, Working paper.

Grullon, Gustavo, and Roni Michaely, 2002, Dividends, Share Repurchases, and the Substitution Hypothesis, *Journal of Finance* 57, 1649–1684.

Guay, Wayne, and Jarrad Harford, 2000, The Cash-Flow Permanence and Information Content of Dividend Increases Versus Repurchases, *Journal of Financial Economics* 57, 385–415.

Hall, Bronwyn H., Clint Cummins, Elizabeth Laderman, and Joy Mundy, 1988, The R D Master File Documentation, NBER Working Paper No. t0072.

Hansen, Lars Peter, John C Heaton, and Nan Li, 2008, Consumption Strikes Back? Measuring Long-Run Risk, *Journal of Political Economy* 116, 260–302.

Jagannathan, Murali, Clifford P. Stephens, and Michael Weisbach, 2000, Financial flexibility and the choice between dividends and stock repurchases, *Journal of Financial Economics* 57, 355–384.

Jermann, Urban J., 1998, Asset pricing in production economies, *Journal of Monetary Economics* 41, 257–275.

Julliard, Christian, and Jonathan Parker, 2005, Consumption Risk and the Cross-Section of Expected Returns, *Journal of Political Economy* 113, 185–222.

Kacperczyk, Marcin, and Philipp Schnabl, 2010, When Safe Proved Risky: Commercial Paper during the Financial Crisis of 20072009, *Journal of Economic Perspective* 24, 29–50.

Kreps, David M., and Evan L. Porteus, 1978, Temporal Resolution of Uncertainty and Dynamic Choice Theory, *Econometrica* 46, 185–200.

Kung, Howard, and Lukas Schmid, 2014, Innovation, Growth, and Asset Prices, *Journal of Finance forthcoming.*

Larrain, Borja, and Motohiro Yogo, 2008, Does Firm Value Move Too Much to be Justified by Subsequent Changes in Cash Flow?, *Journal of Financial Economics* 87, 200–226.

Lintner, John, 1956, Distribution of Incomes of Corporations Among Dividends, Retained Earnings, and Taxes, *The American Economic Review* 46, 97–113.

Lochstoer, L., and G. Kaltenbrunner, 2010, Long-Run Risk through Consumption Smoothing, *Review of Financial Studies* 23, 3141–89.

Mehra, Rajnish, and Edward C. Prescott, 1985, The Equity Premium: A Puzzle, *Journal of Monetary Economics* 15, 145–161.

Richardson, Scott A., and Richard G. Sloan, 2003, External Financing and Future Stock Returns, Rodney l. white center for financial research working paper no. 03-03.

Rietz, Thomas, 1988, The Equity Risk Premium: A Solution, *Journal of Monetary Economics* 22, 117–131.

Weil, Philippe, 1989, The Equity Premium Puzzle and the Risk-free Rate Puzzle, *Journal of Monetary Economics* 24, 401–421.

Welch, Ivo, and Amit Goyal, 2008, A comprehensive look at the empirical performance of equity premium prediction, *Review of Financial Studies* 21, 1455–1508.

Whitcher, Brandon, Peter Guttorp, and Donald B. Percival, 2000, Wavelet analysis of covariance with application to atmospheric time series, *Journal of Geophysical Research* 105, 14,941 – 14,962.

Tables and Figures

Table 1: **Asset Returns in the Data**

	Equity	Debt	Asset
Mean	7.91	3.19	6.95
Std	15.96	6.59	12.64
AC(1)	-0.08	0.20	-0.06
	Cross-Correlations:		
Debt	0.45		
Asset	0.99	0.53	

The Table reports summary statistics for equity, debt, and total asset returns. The mean and standard deviation are in percentage terms. The data are real annual observations from 1975 to 2017.

Table 2: **Asset Payouts in the Data**

(a) **Cash Payout**

	Equity	Debt	Asset
Mean	0.11	0.09	0.20
Std	0.24	0.37	0.50
AC(1)	0.09	0.35	0.30
	Cross-Correlations:		
Debt	0.31		
Asset	0.71	0.89	

(b) **Net Issuance**

	Equity	Debt	Asset
Mean	0.07	0.12	0.19
Std	3.53	3.78	4.83
AC(1)	-0.08	-0.10	-0.05
	Cross-Correlations:		
Debt	-0.13		
Asset	0.63	0.69	

(c) **Total Payout**

	Equity	Debt	Asset
Mean	0.04	-0.03	0.00
Std	3.62	3.54	4.72
AC(1)	-0.06	-0.16	-0.07
	Cross-Correlations:		
Debt	-0.13		
Asset	0.67	0.65	

The Table reports summary statistics for the changes in equity, debt, and asset payouts, scaled by the consumption level. The payouts include cash payouts, net issuances, and total payouts. The mean and standard deviation are in percentage terms. The data are real annual observations from 1975 to 2017.

Table 3: **Asset Payout Cyclicality**

(a) **Annual Data (1975-2017)**

$corr(\cdot, \Delta c)$	$\frac{\Delta D}{C}$	$\frac{\Delta NI}{C}$	$\frac{\Delta D_a}{C}$	$corr(\cdot, \Delta y)$	$\frac{\Delta D}{Y}$	$\frac{\Delta NI}{Y}$	$\frac{\Delta D_a}{Y}$
Equity	0.33	-0.16	0.18	Equity	0.45	-0.28	0.30
Debt	0.29	0.06	-0.04	Debt	0.31	0.20	-0.18
Asset	0.38	-0.06	0.11	Asset	0.44	-0.05	0.10

(b) **Annual Data (1975-2006)**

$corr(\cdot, \Delta c)$	$\frac{\Delta D}{C}$	$\frac{\Delta NI}{C}$	$\frac{\Delta D_a}{C}$	$corr(\cdot, \Delta y)$	$\frac{\Delta D}{Y}$	$\frac{\Delta NI}{Y}$	$\frac{\Delta D_a}{Y}$
Equity	0.21	0.05	-0.04	Equity	0.32	-0.18	0.20
Debt	0.09	0.06	-0.06	Debt	0.08	0.14	-0.14
Asset	0.19	0.08	-0.07	Asset	0.24	-0.02	0.04

(c) **Quarterly Data (1975-2017)**

$corr(\cdot, \Delta c)$	$\frac{\Delta D}{C}$	$\frac{\Delta NI}{C}$	$\frac{\Delta D_a}{C}$	$corr(\cdot, \Delta y)$	$\frac{\Delta D}{Y}$	$\frac{\Delta NI}{Y}$	$\frac{\Delta D_a}{Y}$
Equity	0.15	-0.01	0.02	Equity	0.14	-0.16	0.16
Debt	0.16	0.00	-0.00	Debt	0.25	-0.06	0.07
Asset	0.20	-0.00	0.01	Asset	0.21	-0.12	0.13

(d) **Quarterly Data (1975-2006)**

$corr(\cdot, \Delta c)$	$\frac{\Delta D}{C}$	$\frac{\Delta NI}{C}$	$\frac{\Delta D_a}{C}$	$corr(\cdot, \Delta y)$	$\frac{\Delta D}{Y}$	$\frac{\Delta NI}{Y}$	$\frac{\Delta D_a}{Y}$
Equity	0.17	0.06	-0.05	Equity	0.11	-0.09	0.09
Debt	-0.08	-0.02	0.02	Debt	0.06	-0.11	0.11
Asset	0.13	0.02	-0.01	Asset	0.13	-0.12	0.13

The Table reports correlations between changes in payouts, scaled by the aggregate level of the economy, and measures of economic growth. The payouts include cash payouts, net issuances, and total payouts, and are computed for equity, debt, and assets. The left and right panels use consumption or output, respectively, to measure the aggregate level of the economy. The data are real, and correspond to (a) annual observations from 1975 to 2017; (b) annual observations from 1975 to 2006; (c) quarterly observations from Q1.1975 to Q4.2017; (d) quarterly observations from Q1.1975 to Q4.2006.

Table 4: **Wavelet Correlation between Asset Payout and Consumption Growth**

Equity

Scale	Cash Payout	Net Issuance	Total Payout
2 - 4 Quarters	0.15 (-0.06, 0.35)	-0.07 (-0.28, 0.14)	0.09 (-0.13, 0.29)
4 - 8 Quarters	0.26 (-0.04, 0.52)	-0.01 (-0.31, 0.29)	0.03 (-0.28, 0.32)
8 - 16 Quarters	0.42 (-0.02, 0.72)	0.10 (-0.35, 0.51)	-0.08 (-0.49, 0.37)
16 - 32 Quarters	0.62 (-0.02, 0.90)	-0.14 (-0.71, 0.53)	0.17 (-0.52, 0.72)
32 - 64 Quarters	0.11 (-0.56, 0.69)	0.06 (-0.59, 0.66)	-0.02 (-0.64, 0.62)

Debt

Scale	Cash Payout	Net Issuance	Total Payout
2 - 4 Quarters	0.05 (-0.16, 0.26)	-0.06 (-0.27, 0.16)	0.05 (-0.16, 0.26)
4 - 8 Quarters	0.06 (-0.24, 0.36)	0.00 (-0.30, 0.30)	-0.00 (-0.30, 0.30)
8 - 16 Quarters	0.19 (-0.26, 0.58)	0.09 (-0.36, 0.50)	-0.06 (-0.48, 0.38)
16 - 32 Quarters	0.31 (-0.40, 0.79)	0.25 (-0.45, 0.76)	-0.20 (-0.74, 0.49)
32 - 64 Quarters	0.50 (-0.19, 0.86)	0.42 (-0.28, 0.83)	-0.29 (-0.78, 0.42)

Asset

Scale	Cash Payout	Net Issuance	Total Payout
2 - 4 Quarters	0.23 (0.01, 0.42)	-0.07 (-0.28, 0.14)	0.08 (-0.14, 0.29)
4 - 8 Quarters	0.29 (-0.01, 0.54)	-0.01 (-0.31, 0.29)	0.02 (-0.28, 0.32)
8 - 16 Quarters	0.37 (-0.08, 0.69)	0.11 (-0.34, 0.52)	-0.10 (-0.51, 0.35)
16 - 32 Quarters	0.49 (-0.20, 0.86)	0.09 (-0.57, 0.68)	-0.06 (-0.66, 0.59)
32 - 64 Quarters	0.48 (-0.21, 0.85)	0.01 (-0.63, 0.63)	0.12 (-0.55, 0.70)

The Table reports wavelet correlations between changes in payouts and consumption growth. The payouts include cash payouts, net issuances, and total payouts, and are computed for equity, debt, and assets. The panels report the estimates of wavelet correlation for different scales, with 5% confidence intervals reported in the brackets. The data are real quarterly observations from Q1.1975 to Q4.2017, seasonally adjusted by x12 ARIMA model.

Table 5: **Configuration of Model Parameters**

Preferences	δ	γ	ψ			
	0.9992	10	1.5			
Consumption	μ_c	ρ_x	φ_x	σ_0	ν	σ_ω
	0.0024	0.985	0.038	0.005	0.999	0.000001
Cash Payout	μ_s	ρ_s	ϕ_s	φ_s	α	
	-2.65	0.96	6	5	-0.15	
Net Issuance	μ_h	φ_h				
	0.045	18				

The Table reports the configuration of model parameters. The model is calibrated at a monthly frequency.

Table 6: **Model Implications: Consumption**

	Data		Model					
	1929-2017	1975-2017	Med	2.5%	5%	95%	97.5%	Pop
$E(\cdot)$	2.85	2.66	2.89	1.23	1.51	4.29	4.60	2.90
$\sigma(\cdot)$	2.80	1.59	1.98	1.13	1.25	3.01	3.20	2.21
$AC(1)$	0.39	0.25	0.43	0.09	0.17	0.65	0.69	0.52
$AC(2)$	0.07	0.18	0.19	-0.17	-0.12	0.49	0.55	0.32
$AC(5)$	-0.07	-0.19	0.02	-0.29	-0.24	0.32	0.36	0.18

The Table reports the data and model properties of real consumption growth. The summary statistics in the data are computed in the annual samples from 1929 to 2017 and from 1975 to 2017. The median and 2.5%, 5%, 95%, and 97.5% values capture the model moment distributions across the small samples whose size equals the data. Population values correspond to a long simulation of the model. Means and volatilities are expressed in percentage terms.

Table 7: **Model Implications: Asset Payouts**

(a) **Cash Payout**

		Model					
	Data	*Med*	2.5%	5%	95%	97.5%	*Pop*
$E(\cdot)$	0.20	0.21	0.04	0.07	0.41	0.45	0.22
$\sigma(\cdot)$	0.50	0.60	0.36	0.38	1.02	1.12	0.67
$AC(1)$	0.30	0.26	-0.03	0.03	0.50	0.53	0.30
$AC(2)$	-0.26	-0.02	-0.31	-0.27	0.26	0.32	0.02
$AC(5)$	-0.21	-0.06	-0.35	-0.30	0.20	0.24	-0.05
$corr(\cdot, \Delta c)$	0.38	0.33	-0.01	0.04	0.55	0.60	0.35
$\%\ of\ Neg\ Payouts$	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(b) **Net Issuance**

		Model					
	Data	*Med*	2.5%	5%	95%	97.5%	*Pop*
$E(\cdot)$	0.19	0.14	-0.10	-0.05	0.34	0.39	0.15
$\sigma(\cdot)$	4.83	4.29	2.46	2.74	6.50	6.79	4.49
$AC(1)$	-0.05	-0.47	-0.69	-0.66	-0.26	-0.21	-0.51
$AC(2)$	-0.45	-0.02	-0.36	-0.31	0.30	0.37	0.02
$AC(5)$	0.06	0.00	-0.34	-0.27	0.29	0.34	-0.00
$corr(\cdot, \Delta c)$	-0.06	0.03	-0.21	-0.17	0.22	0.26	0.01
$\%\ of\ Neg\ Payouts$	6.98	5.00	0.00	0.00	12.50	15.00	4.52

(c) **Total Payout**

		Model					
	Data	*Med*	2.5%	5%	95%	97.5%	*Pop*
$E(\cdot)$	0.00	0.07	-0.18	-0.14	0.31	0.38	0.07
$\sigma(\cdot)$	4.72	4.33	2.47	2.77	6.53	6.89	4.53
$AC(1)$	-0.07	-0.46	-0.68	-0.65	-0.25	-0.20	-0.49
$AC(2)$	-0.44	-0.01	-0.35	-0.31	0.29	0.36	0.02
$AC(5)$	0.05	0.00	-0.34	-0.28	0.29	0.33	-0.00
$corr(\cdot, \Delta c)$	0.11	0.03	-0.21	-0.18	0.22	0.26	0.04
$\%\ of\ Neg\ Payouts$	37.21	25.00	7.50	10.00	47.50	51.25	27.23

The Table reports the data and model properties of changes in asset payouts, scaled by the consumption level. The payouts include cash payouts, net issuances, and total payouts. The summary statistics in the data are computed in the annual sample from 1975 to 2017. The median and 2.5%, 5%, 95%, and 97.5% values capture the model moment distributions across the small samples whose size equals the data. Population values correspond to a long simulation of the model. Means and volatilities are expressed in percentage terms.

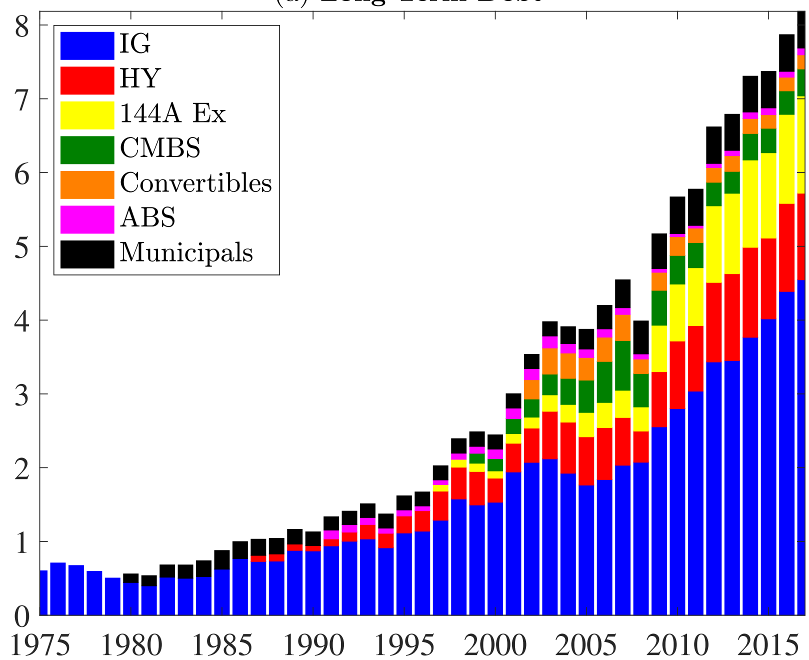
Table 8: **Model Implications for Asset Prices**

		Model					
Moment	Data	Median	2.5%	5%	95%	97.5%	*Pop*
			Risk-Free Return:				
$E(r_f)$	0.79	1.64	0.26	0.49	2.43	2.59	1.62
$\sigma(r_f)$	1.75	0.81	0.43	0.48	1.39	1.51	1.04
			Asset Return:				
$E(r_d)$	6.95	6.18	-0.10	1.46	10.60	11.66	6.11
$\sigma(r_d)$	12.64	12.04	7.84	8.40	20.52	22.75	13.23

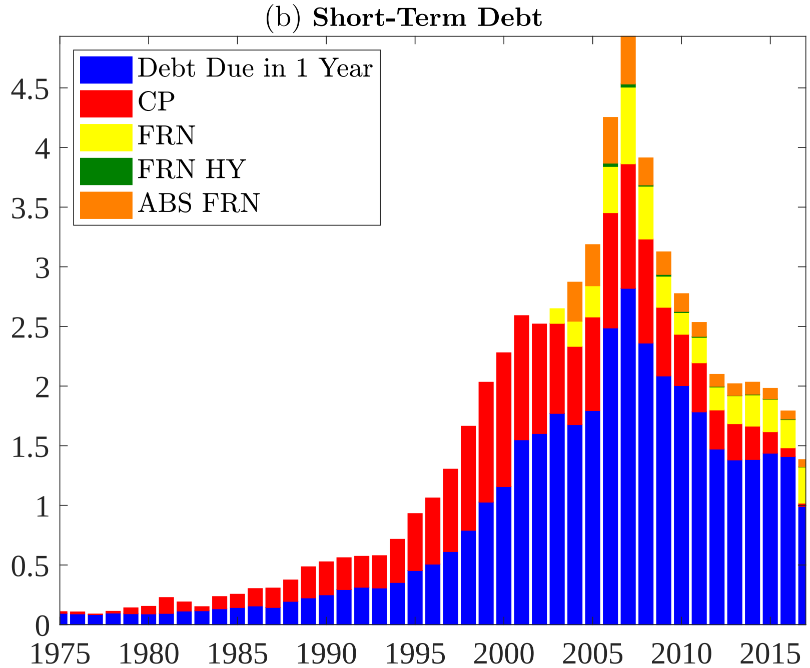
The Table reports the data and model properties of the real risk-free rate and the asset return. The summary statistics in the data are computed in the annual sample from 1975 to 2017. The median and 2.5%, 5%, 95%, and 97.5% values capture the model moment distributions across the small samples whose size equals the data. Population values correspond to a long simulation of the model. Means and volatilities are expressed in percentage terms.

Figure 1: **Debt Market Capitalization**

(a) **Long-Term Debt**

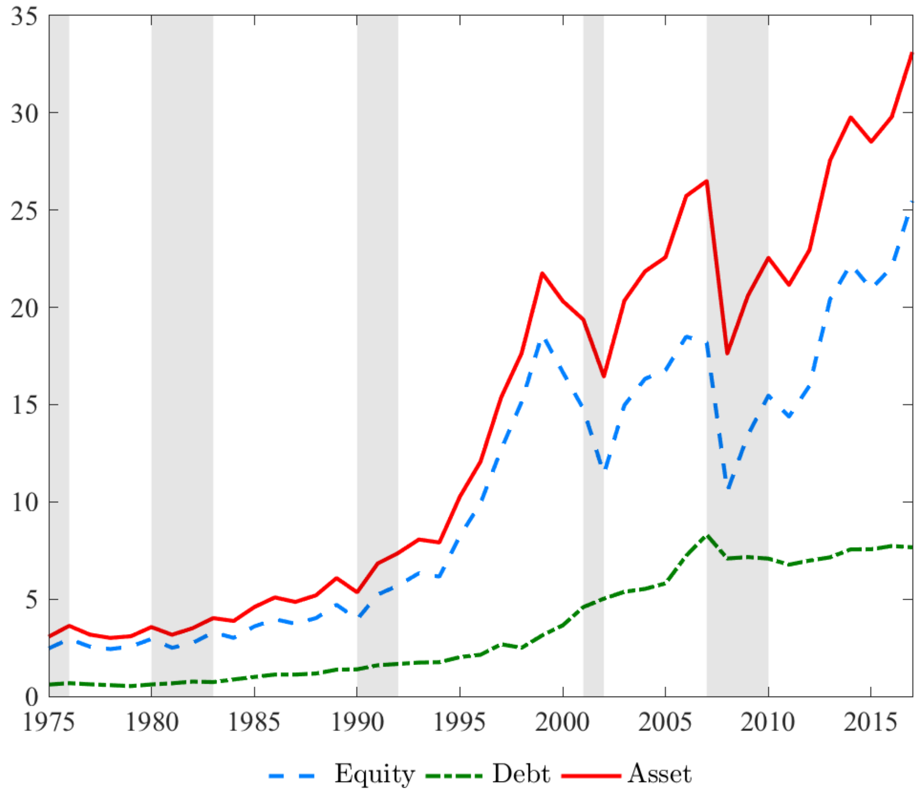


(b) **Short-Term Debt**



The Figure shows the market value of the components of the long-term and short-term corporate debt. The data are real annual observations from 1975 to 2017, and are expressed in trillions of December 2009 dollars.

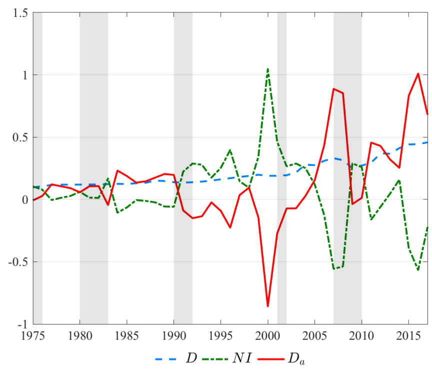
Figure 2: **Asset Market Capitalization**



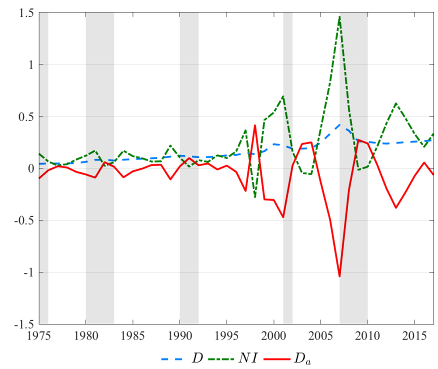
The Figure shows the market values of equity, debt, and assets. Grey bars indicate the NBER recessions. The data are real annual observations from 1975 to 2017, and are expressed in trillions of December 2009 dollars.

Figure 3: **Equity, Debt, and Asset Payouts**

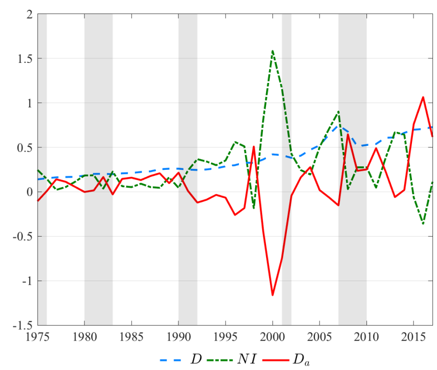
Equity Payout



Debt Payout

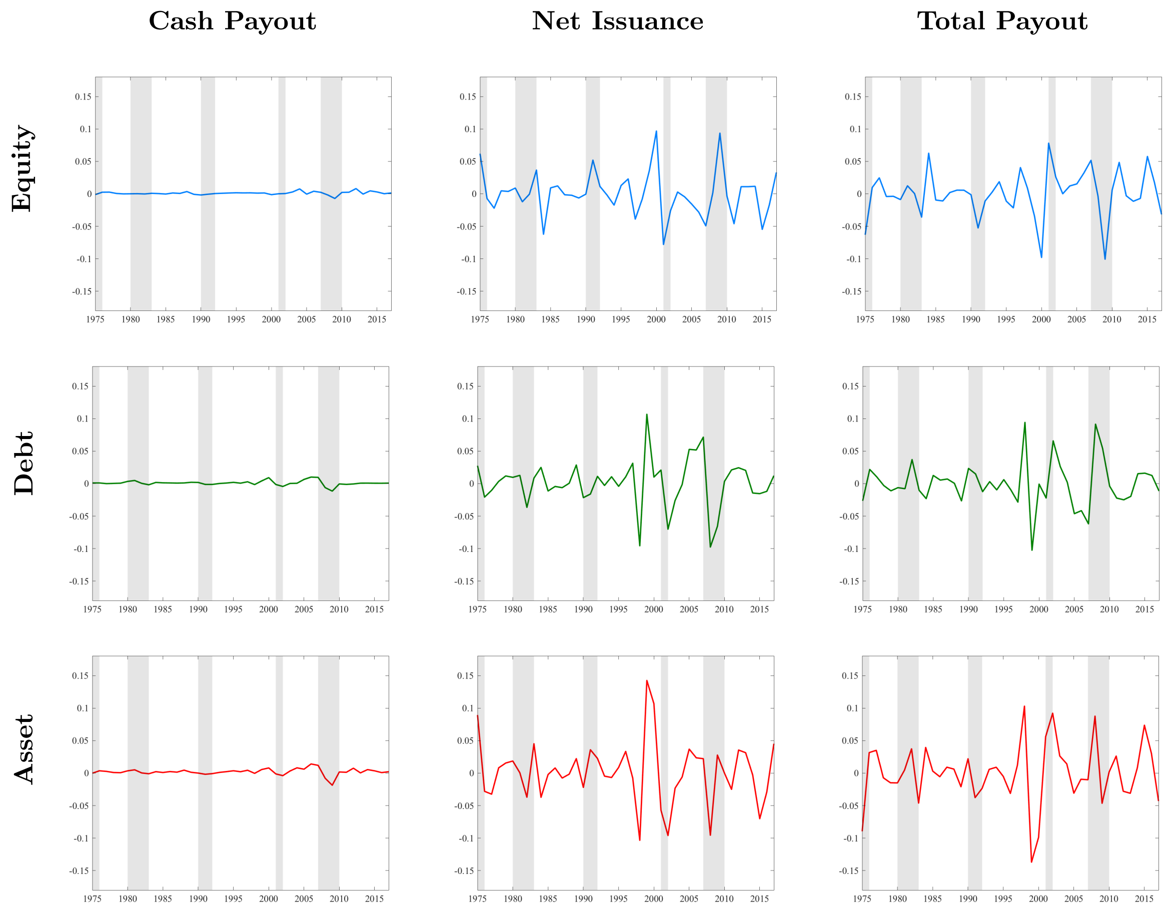


Asset Payout



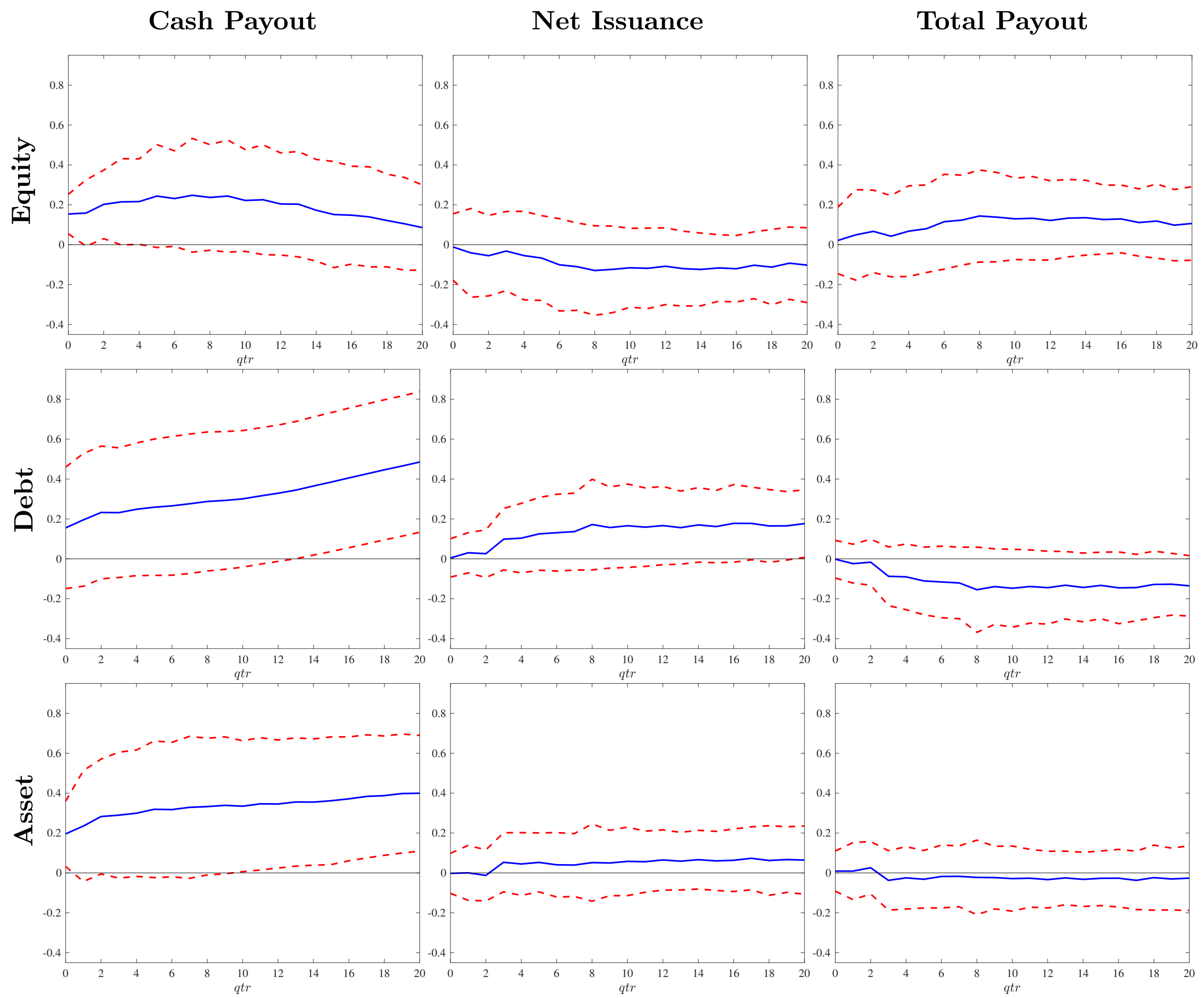
The Figure shows equity, debt, and asset payouts. The payouts include cash, net issuances, and total payouts. Grey bars indicate the NBER recessions. The data are real annual observations from 1975 to 2017, and are expressed in trillions of December 2009 dollars.

Figure 4: **Changes in Equity, Debt, and Asset Payouts**



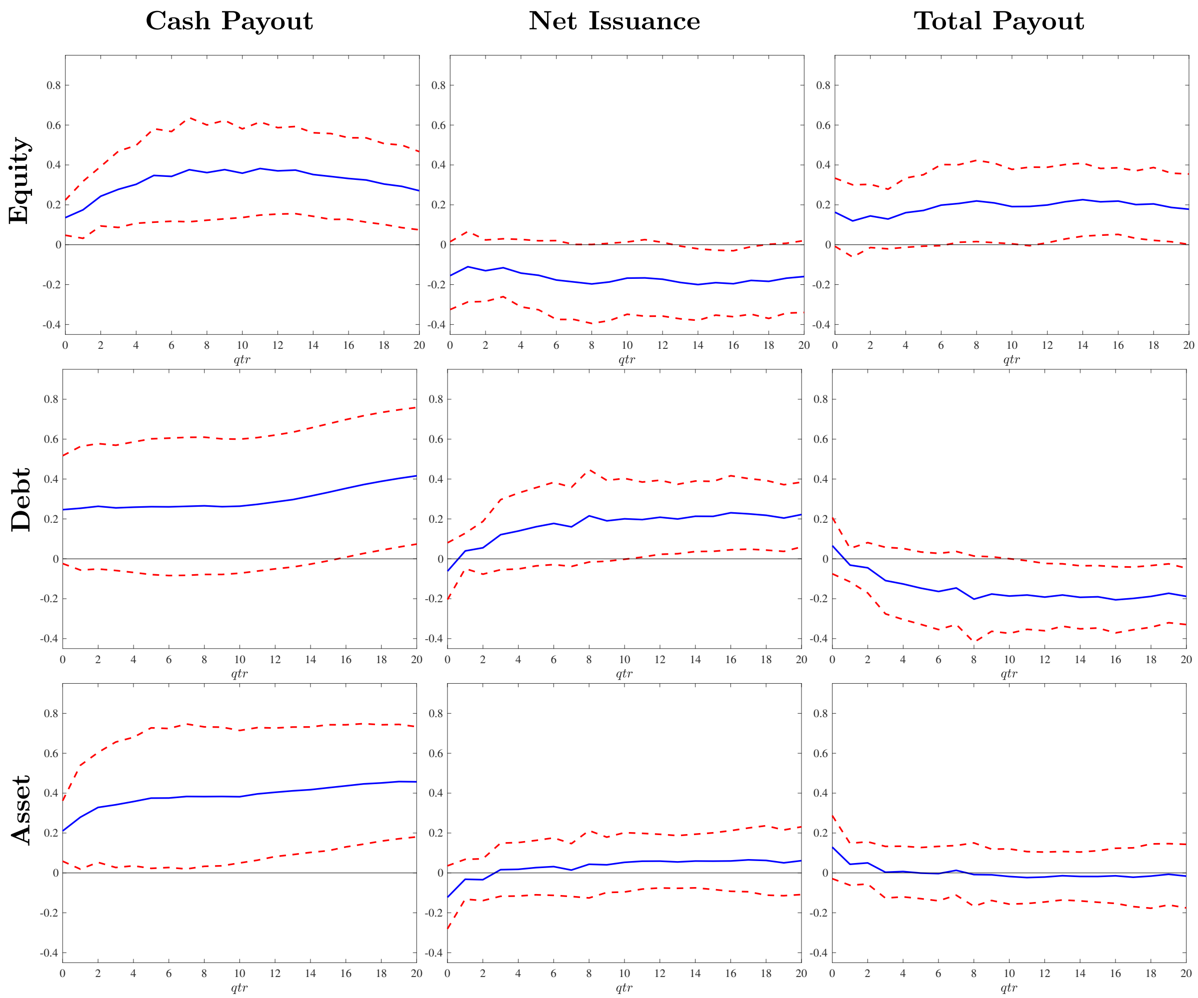
The Figure shows changes in equity, debt, and asset payouts, scaled by the consumption level. The payouts include cash, net issuances, and total payouts. Grey bars indicate the NBER recessions. The data are real annual observations from 1975 to 2017.

Figure 5: **Term Structure of Payout Cyclicality (Consumption)**



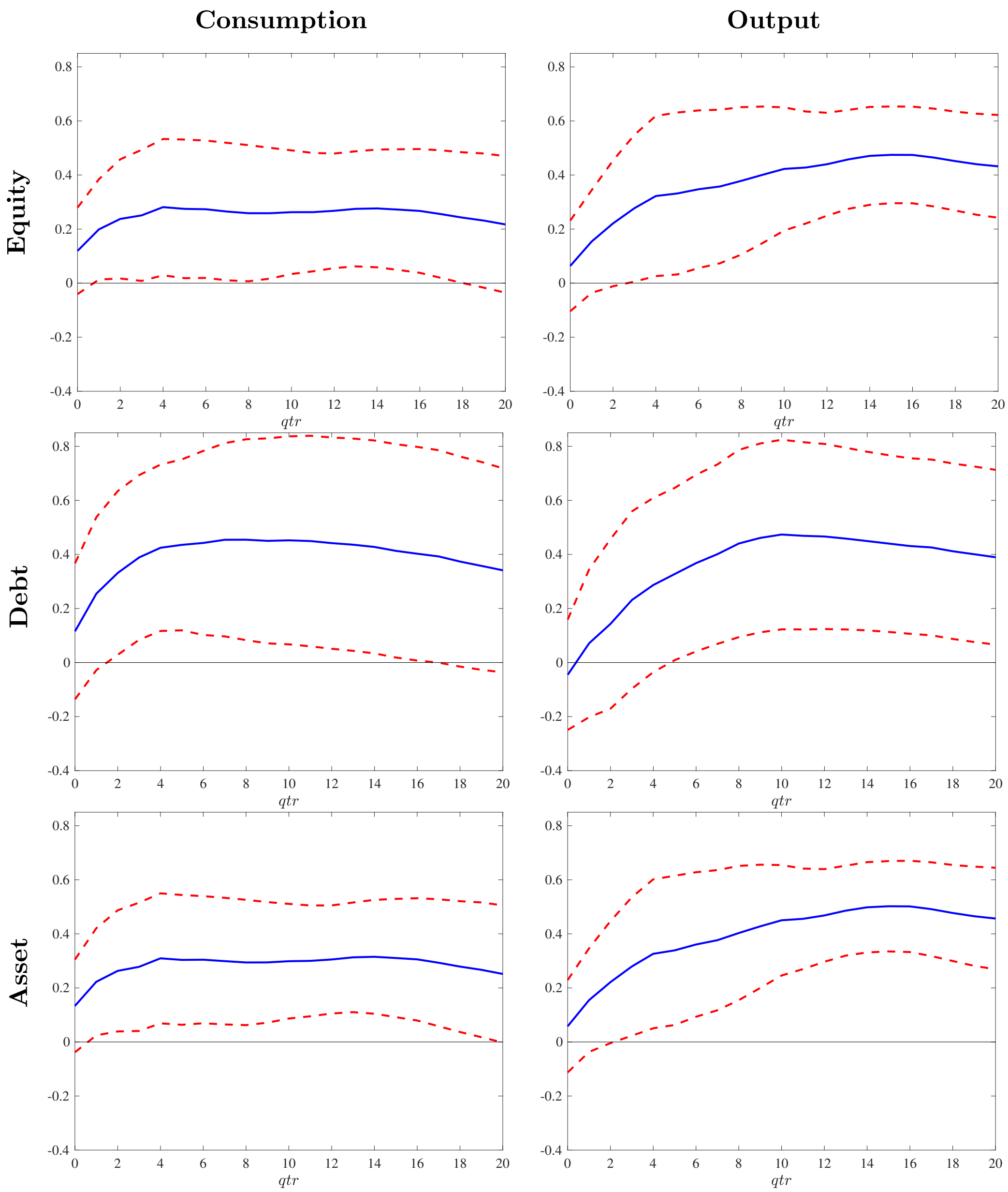
The Figure shows multi-horizon correlations between equity, debt, and asset payouts and consumption growth. The payouts include cash, net issuances, and total payouts. The data are real quarterly observations from Q1.1975 to Q4.2017. The standard errors are Newey-West adjusted.

Figure 6: **Term Structure of Payout Cyclicality (Output)**



The Figure shows multi-horizon correlations between equity, debt, and asset payouts and output growth. The payouts include cash, net issuances, and total payouts. The data are real quarterly observations from Q1.1975 to Q4.2017. The standard errors are Newey-West adjusted.

Figure 7: **Term Structure of Return Cyclicality**

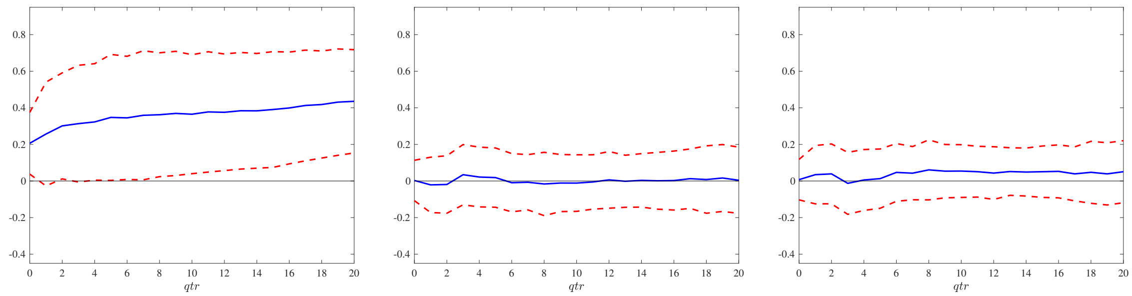


The Figure shows multi-horizon correlations between equity, debt, and asset excess returns and measures of economic growth, such as consumption (left panels) and output (right panels). The data are real quarterly observations from Q1.1975 to Q4.2017. The standard errors are Newey-West adjusted.

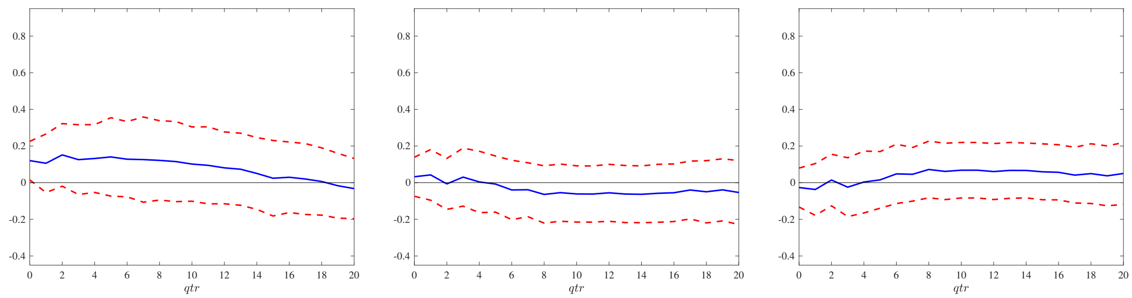
Figure 8: **Term Structure of Corporate Asset Payout Cyclicality: Robustness**

Exclude Insurance Companies:

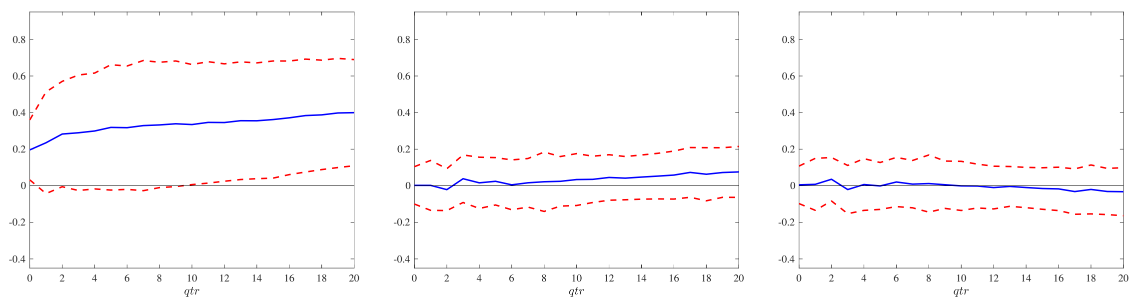
Cash Payout **Net Issuance** **Total Payout**



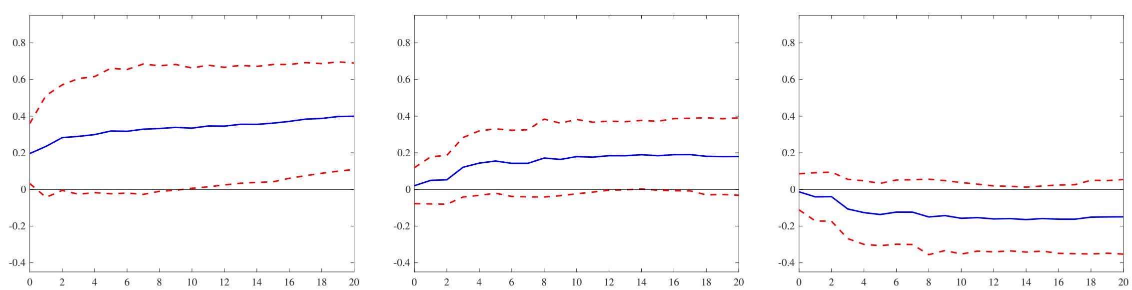
Exclude Financial Sector:



Exclude IPOs:

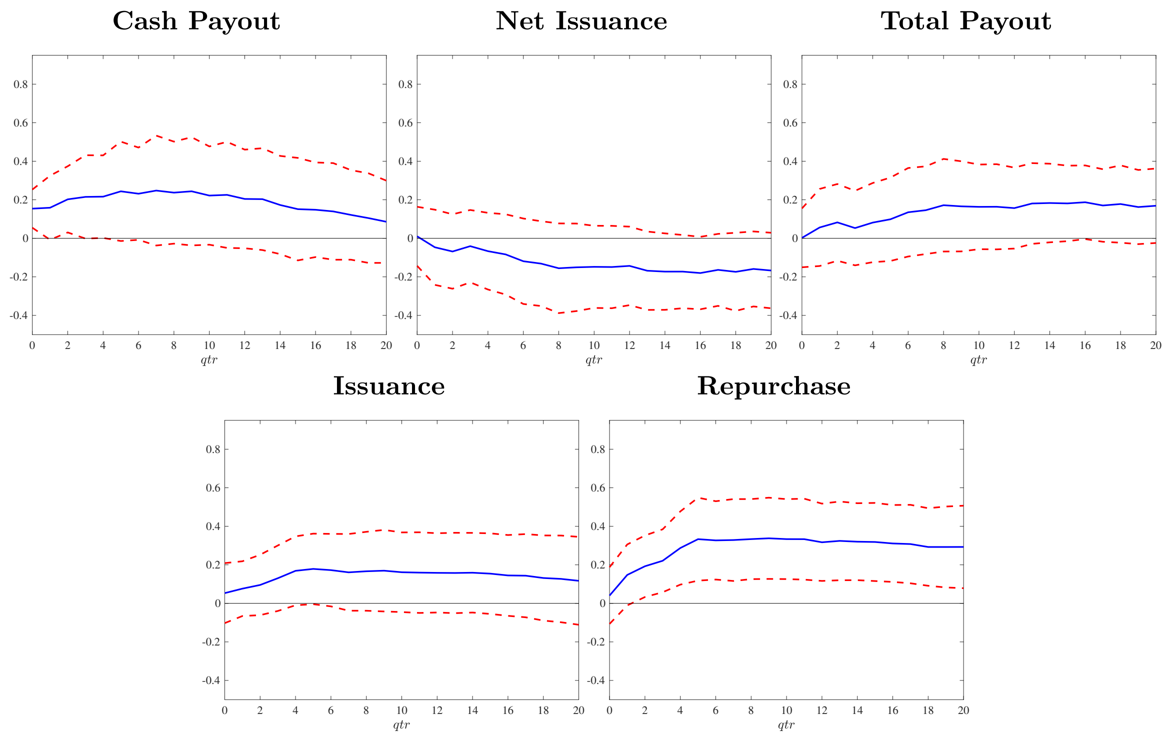


Exclude Mergers and Acquisitions:



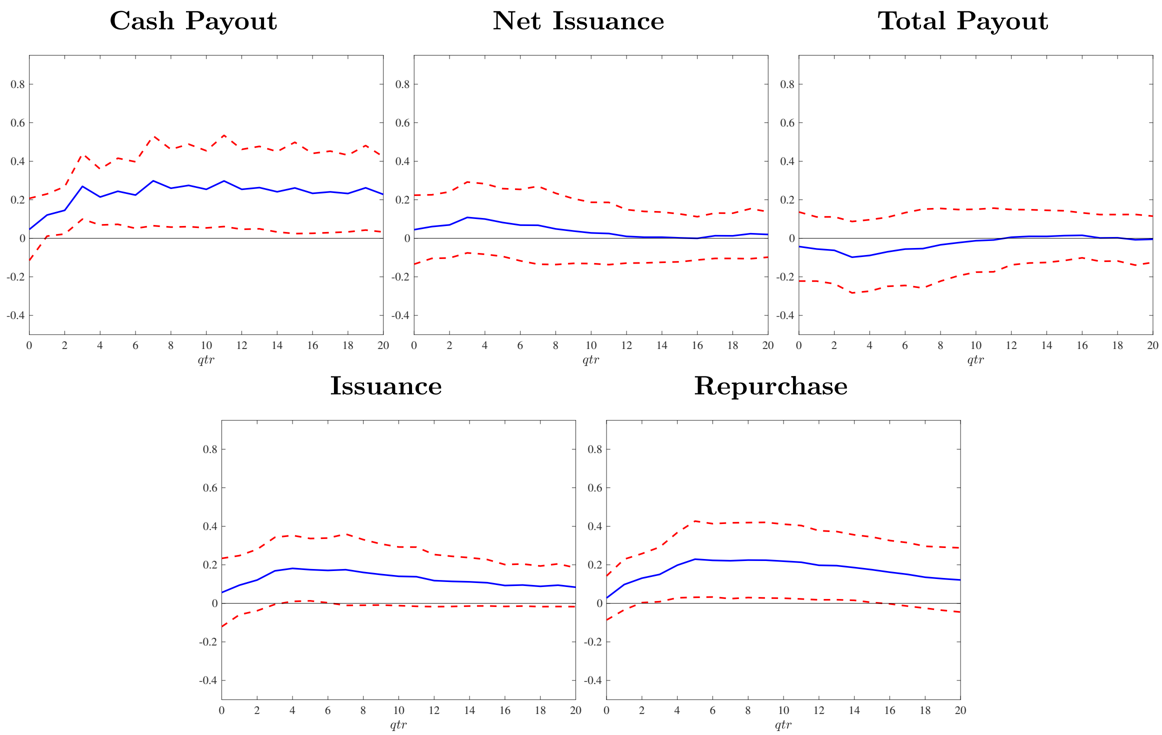
The Figure shows multi-horizon correlations between corporate asset payouts and consumption growth. The payouts include cash, net issuances, and total payouts. The data are real quarterly observations from Q1.1975 to Q4.2017. The standard errors are Newey-West adjusted.

Figure 9: **Term Structure of Equity Payout Cyclicality: 1975-2017**



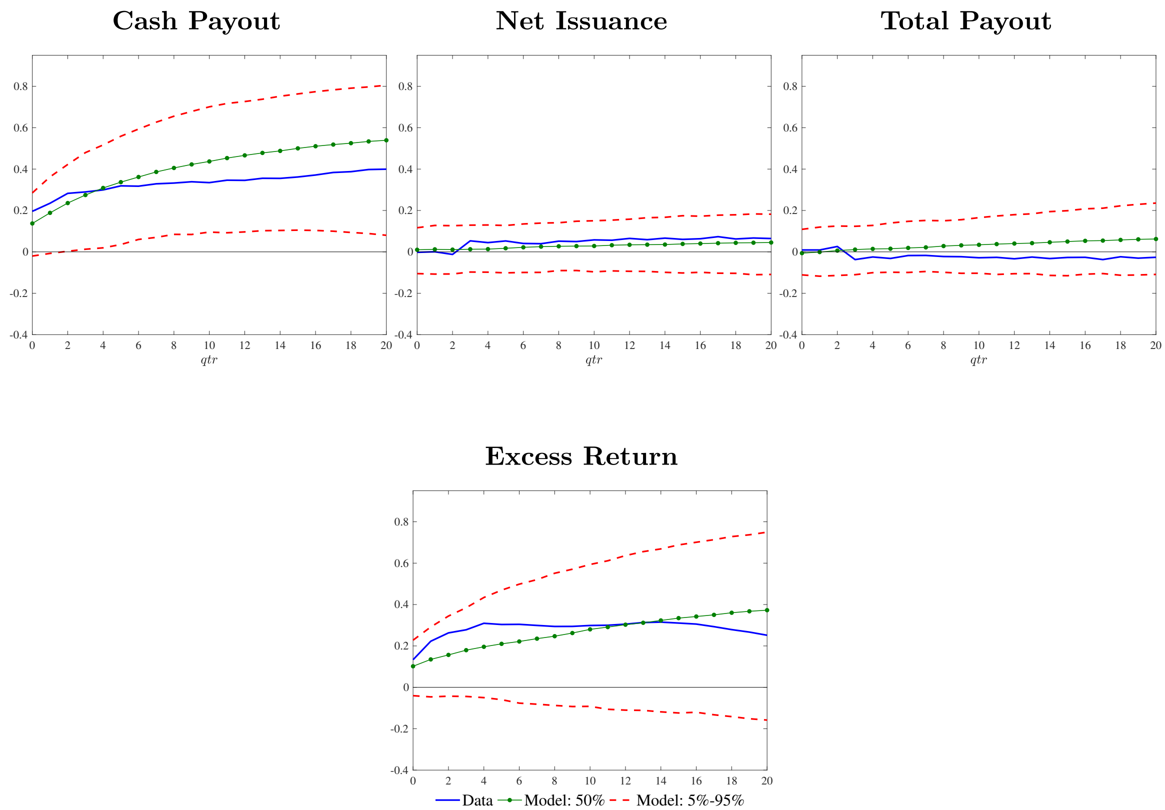
The Figure shows multi-horizon correlations between equity payouts and consumption growth. The payouts include cash, net issuances, issuances, repurchases, and total payouts. The data are real quarterly observations from Q1.1975 to Q4.2017. The standard errors are Newey-West adjusted.

Figure 10: **Term structure of Equity Payout Cyclicality: 1949-2017**



The Figure shows the multi-horizon correlations between components of equity payout and consumption growth. The Figure shows multi-horizon correlations between equity payouts and consumption growth. The payouts include cash, net issuances, issuances, repurchases, and total payouts. The data are real quarterly observations from Q1.1949 to Q4.2017. The standard errors are Newey-West adjusted.

Figure 11: **Model Implications for Payout and Return Cyclicality**



The Figure shows multi-horizon correlations between asset payouts and consumption growth, and excess asset returns and consumption growth in the data and in the model. The payouts include cash, net issuances, and total payouts. The data (solid line) are real quarterly observations from Q1.1975 to Q4.2017. Model median (circles) and 5-95% confidence interval (dashed line) are based on a long simulation of the model.