

# Cash Flow & Cash Levels Review

February 14–15, 2019



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# EXECUTIVE SUMMARY

# Executive Summary

TMRS cash needs continue to evolve as the portfolio has been invested/diversified over the last 5 years.

Recommend we not change the Cash Target Allocation at this time, but instead continue to let the Cash level drift up within current IPS guidelines towards 2% given all the current portfolio factors (discussed later).

Evaluate the need to adjust the Target Cash level in this year's Asset-Liability/ Asset Allocation study.

# BACKGROUND

# General and Environmental Factors

TMRS cash needs are driven by multiple general and environmental factors including:

- ❖ Current IPS has a 0–10% range with a 0% target
- ❖ Currently only keep “known” cash flow needs plus \$10 million cushion in true cash
- ❖ Using a State Street sweep vehicle earning around 2.2%
- ❖ Higher uncertainties going forward, may be late cycle
- ❖ Cash flows coming in from redemptions from ARS
- ❖ Increased risk of volatility up, earnings down in 2019
- ❖ Traditional bonds, low to negative returns in rising rate environment (0.03% for 2018)
- ❖ Correlation between stocks and bonds is positive (which is bad for diversification and protection so want more cash)

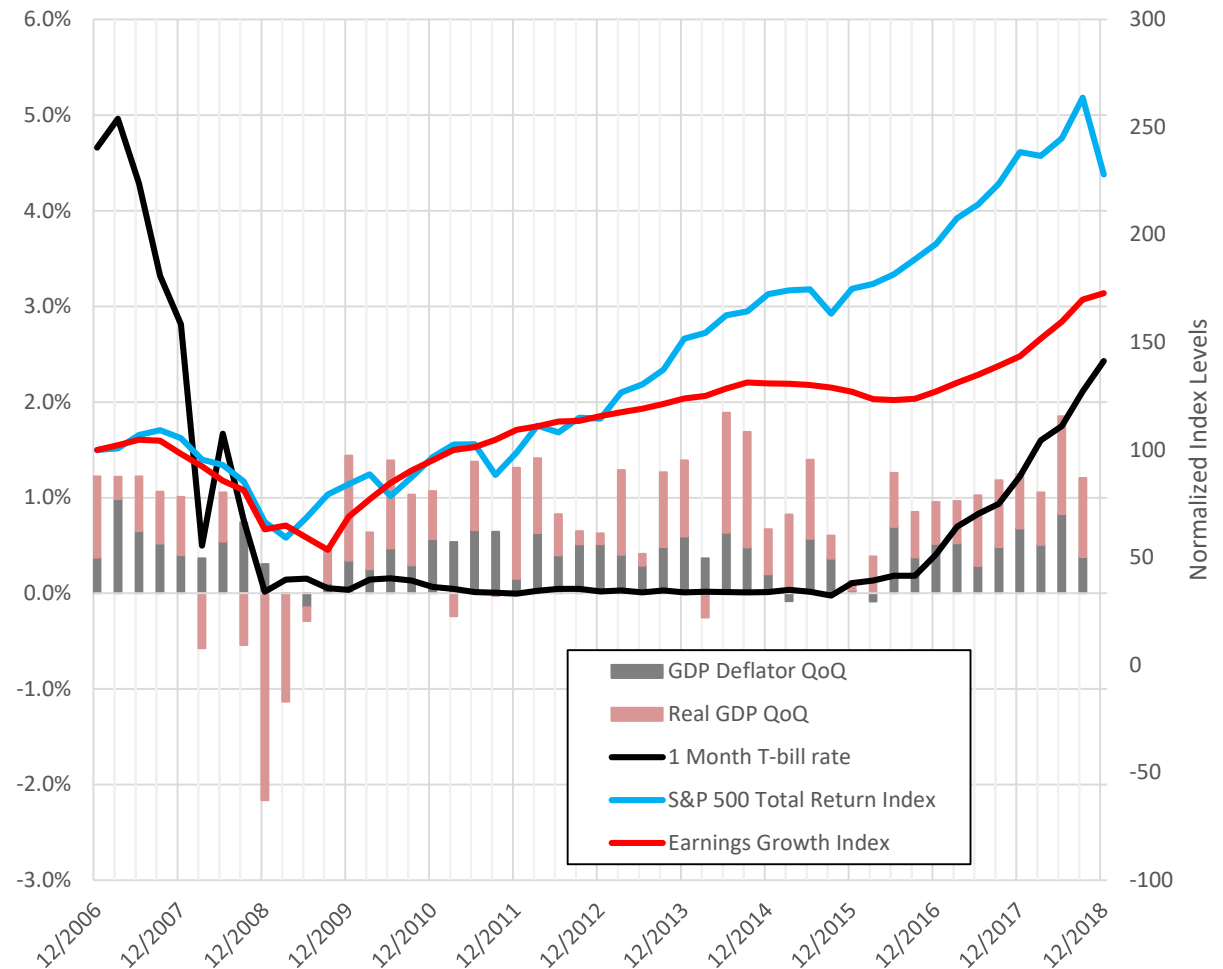
# Changing TMRS Needs

TMRS cash needs are changing as the portfolio matures and the global economy progresses. These changes are driven by multiple factors including, but not limited to:

- ❖ the increasing number of private market “call down” vehicles in the portfolio
- ❖ investment strategies that will have high cash needs exactly when market liquidity is lowest
- ❖ slowly increasing cash flow negativity due to increasing aggregate benefit payouts
- ❖ decrease in cash flow coming from liquid investments due to portfolio allocation decreases
- ❖ the uncertainty around the current stage of the business cycle and the need to be prepared for the next downturn, *before* it hits

# Market volatility has been high and markets are “nervous,” but it is not clear that we are in a classical late stage of the economic cycle

- ❖ Q4 2018 Estimates (Annual Rate)
  - Real GDP 2.5% – 3.0%
  - CPI 1.2%
- ❖ None of: Earnings Growth, GDP or CPI, suggest we are in the late stage of the economic cycle
- ❖ There has been a stock market correction but it is also easy to see that prices (valuations) had outpaced earnings growth (fundamentals)
- ❖ The Fed has also been increasing rates to a normal level (one where real rates are positive) and this is causing a repricing of the market





# Investment Vehicle Factors

- ❖ Increase in call down vehicles (and co-investments) – Can't default on commitments
  - Private Equity
  - Real Estate
  - Real Assets
  - Non-Core Fixed Income
- ❖ Contingent vehicles – large cash draws at illiquid points in a cycle
- ❖ Distressed Situation vehicles – Prepare for cash draws when opportunities increase
- ❖ General lack of liquidity when you want it most
- ❖ Have cash to take advantage of opportunities

# NEW CASH FLOW TOOL

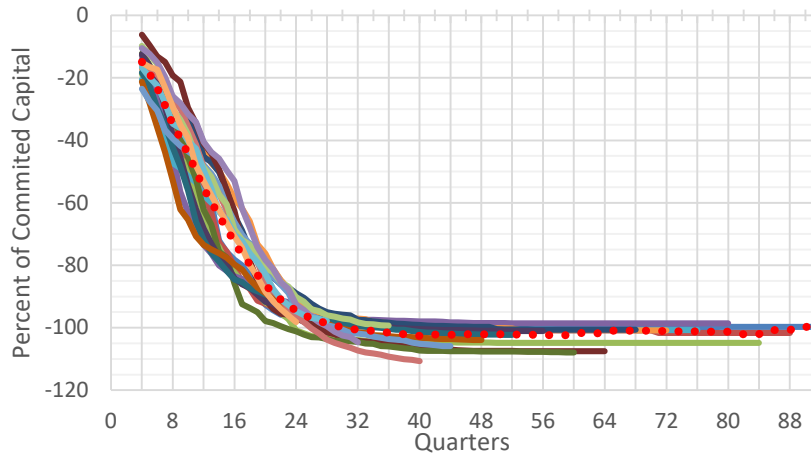
# New Cash Flow Tool Genesis

The new tool was developed by TMRS Risk to monitor and model evolving private market fund cash flows

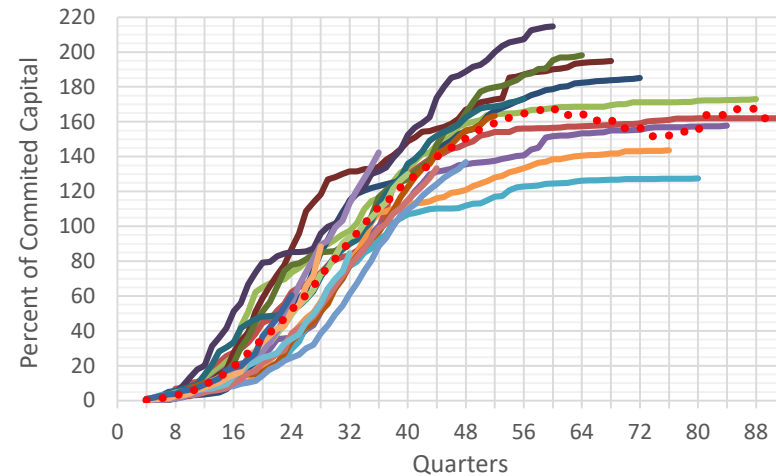
- ❖ History (to date) is pulled for Capital Commitments, Capital Calls, Distributions, and Market Values for ALL private market funds
- ❖ Modified Takahashi and Alexander model (2001) is used to simulate expected Capital Call and Distribution pacing plans for each private market fund
- ❖ Expected quarterly cash flows and market values (recognizing expected returns) for each private market fund are projected out for 8 years
- ❖ Future private market fund commitments are assumed to:
  - Replace maturing funds
  - Achieve targeted funding levels

# Private Equity – Buyout: Cash Flows follow a fairly consistent pattern across vintage years

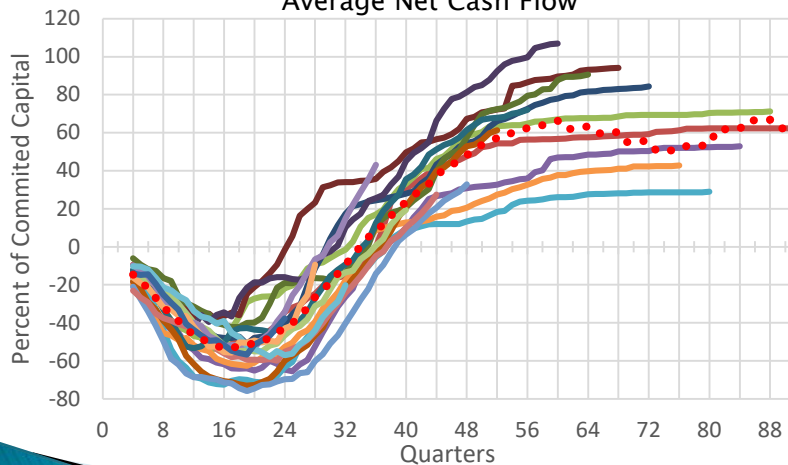
Average Paid in Capital



Average Disbursements



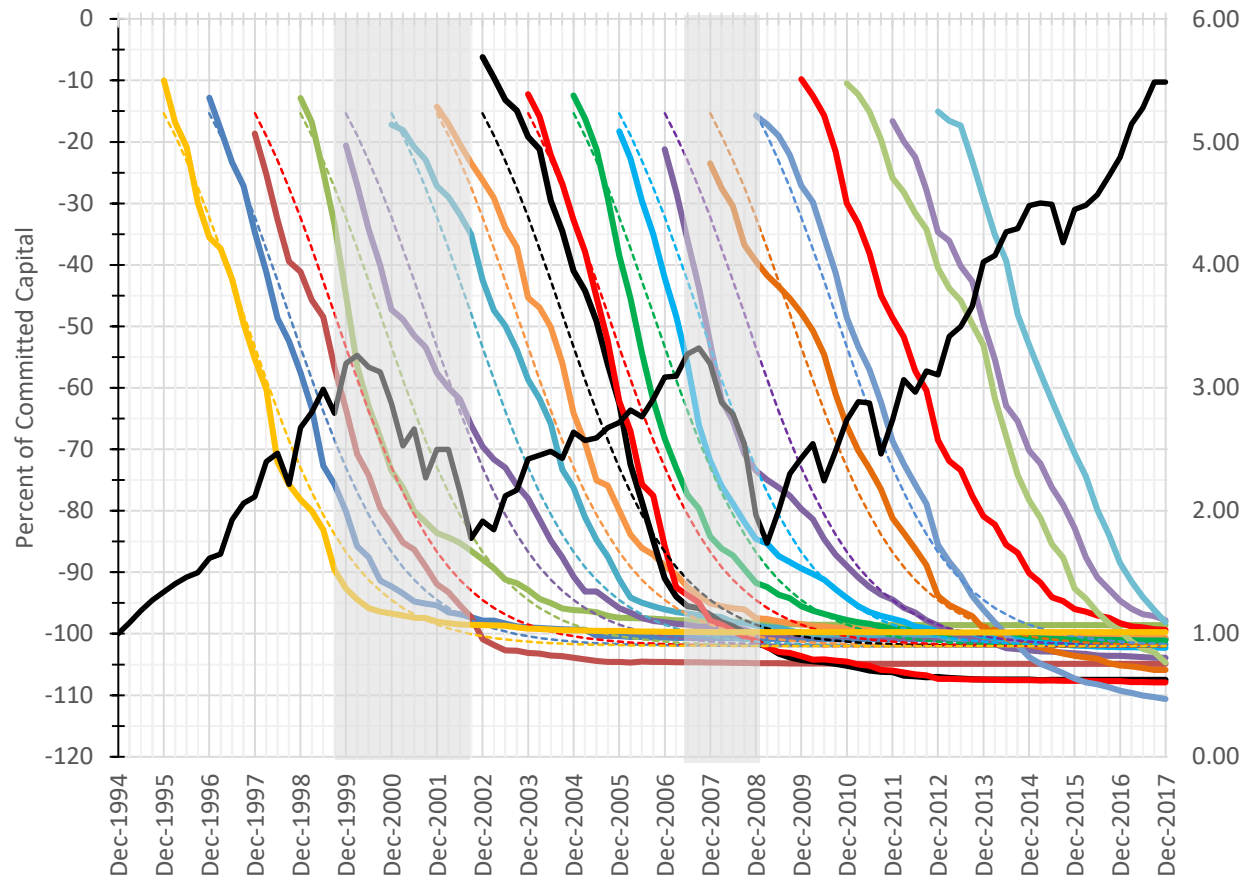
Average Net Cash Flow



- ❖ Each line/color represents a vintage year (1995 to 2012)
- ❖ Horizontal axis is quarters from fund inception
- ❖ Dotted red line is the average across all vintage years
- ❖ The “average” shapes are defined so effects of market crashes can be observed in terms of difference from average

# Private Equity – Buyout: On average, Capital Calls do not accelerate during, or immediately after, market crashes

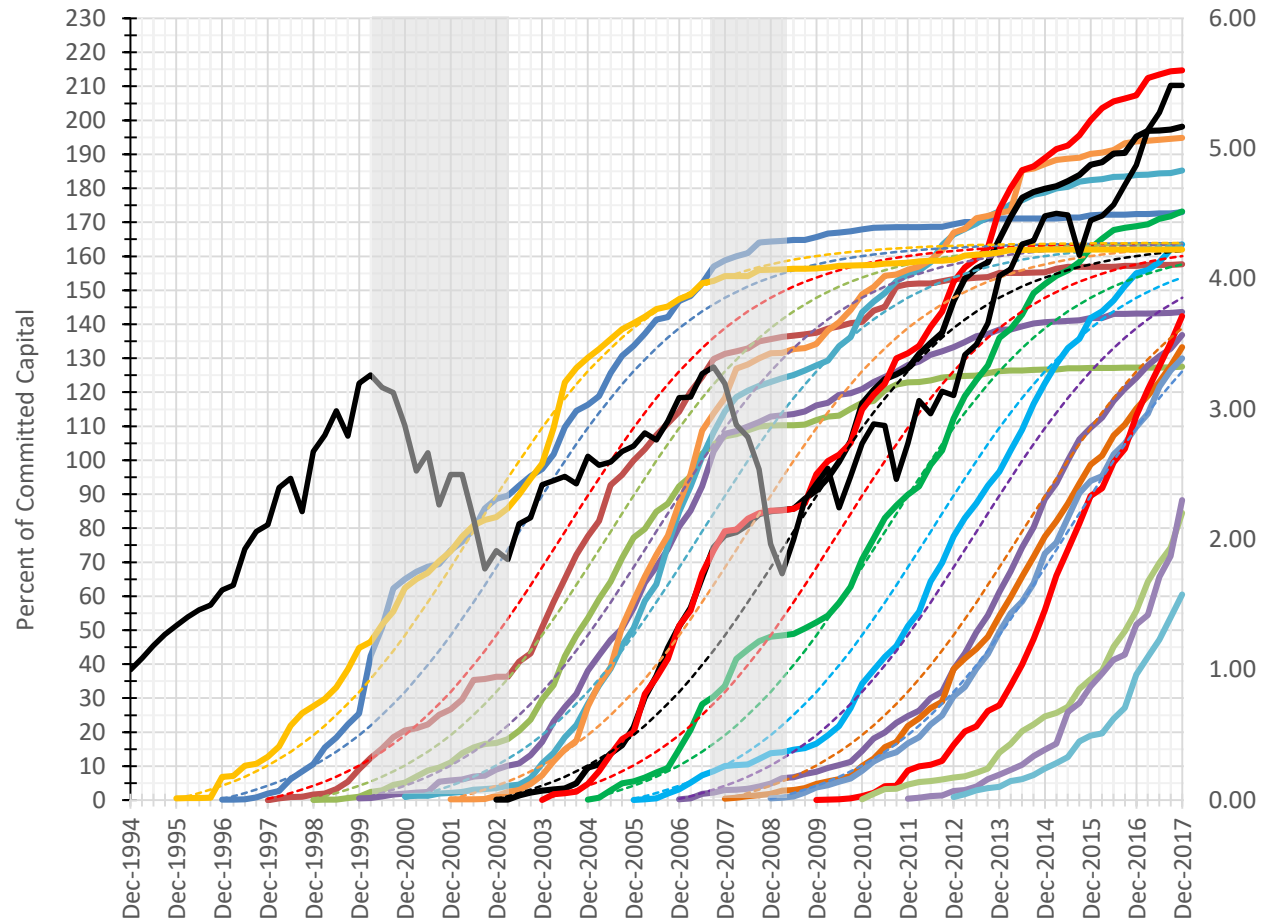
- ❖ Capital Calls tend to decelerate rather than accelerate in declining or stressed markets
- ❖ Interestingly, capital calls are larger than expected in the years just before a market peak
- ❖ Behavior is similar in both the Tech Bubble crash and the GFC



- ❖ Vintage Years are Solid Lines
- ❖ “Expected” shape for each Vintage Year is the dotted line in matching color
- ❖ S&P 500 Index is Shown in Black

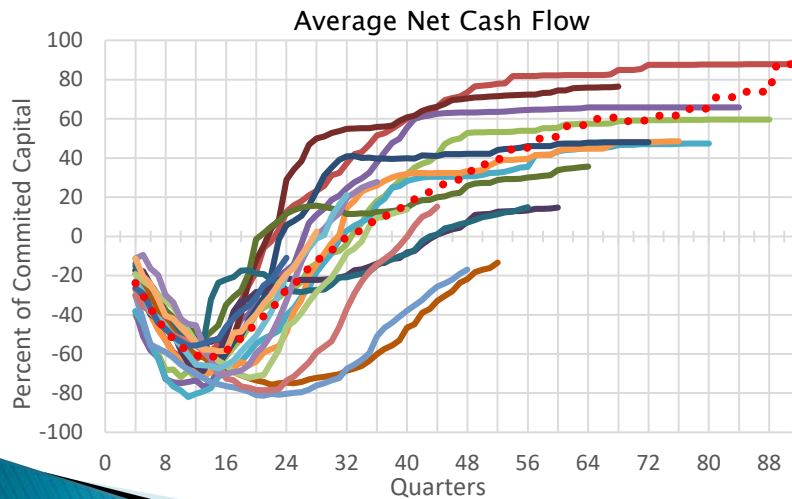
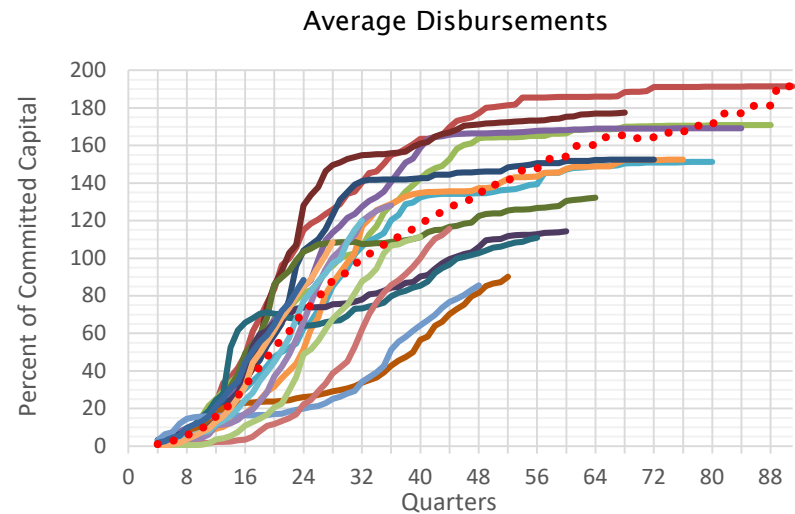
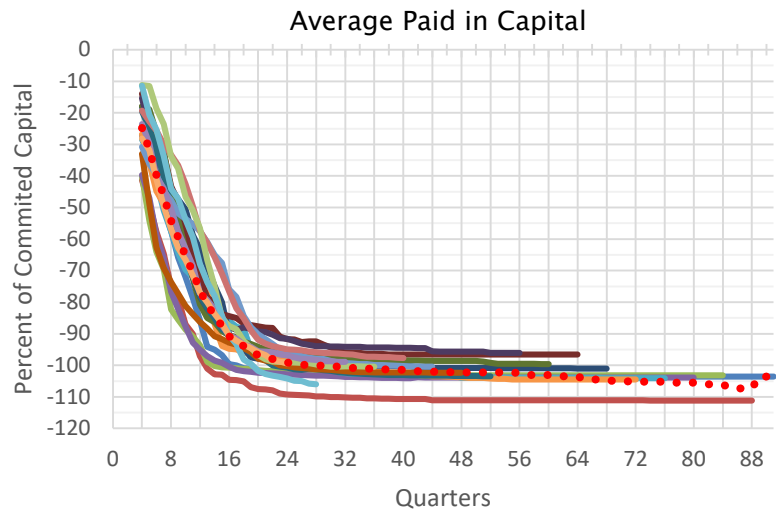
# Private Equity – Buyout: On average, Distributions significantly decrease during and immediately after market crashes

- ❖ Distributions significantly slow down across all vintage years in Financial Crisis
- ❖ Slowing distributions are also observed in the selloff following the Tech Bubble but are not as pronounced as in the Financial Crisis



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# Private Real Estate: Average Cash Flow Patterns

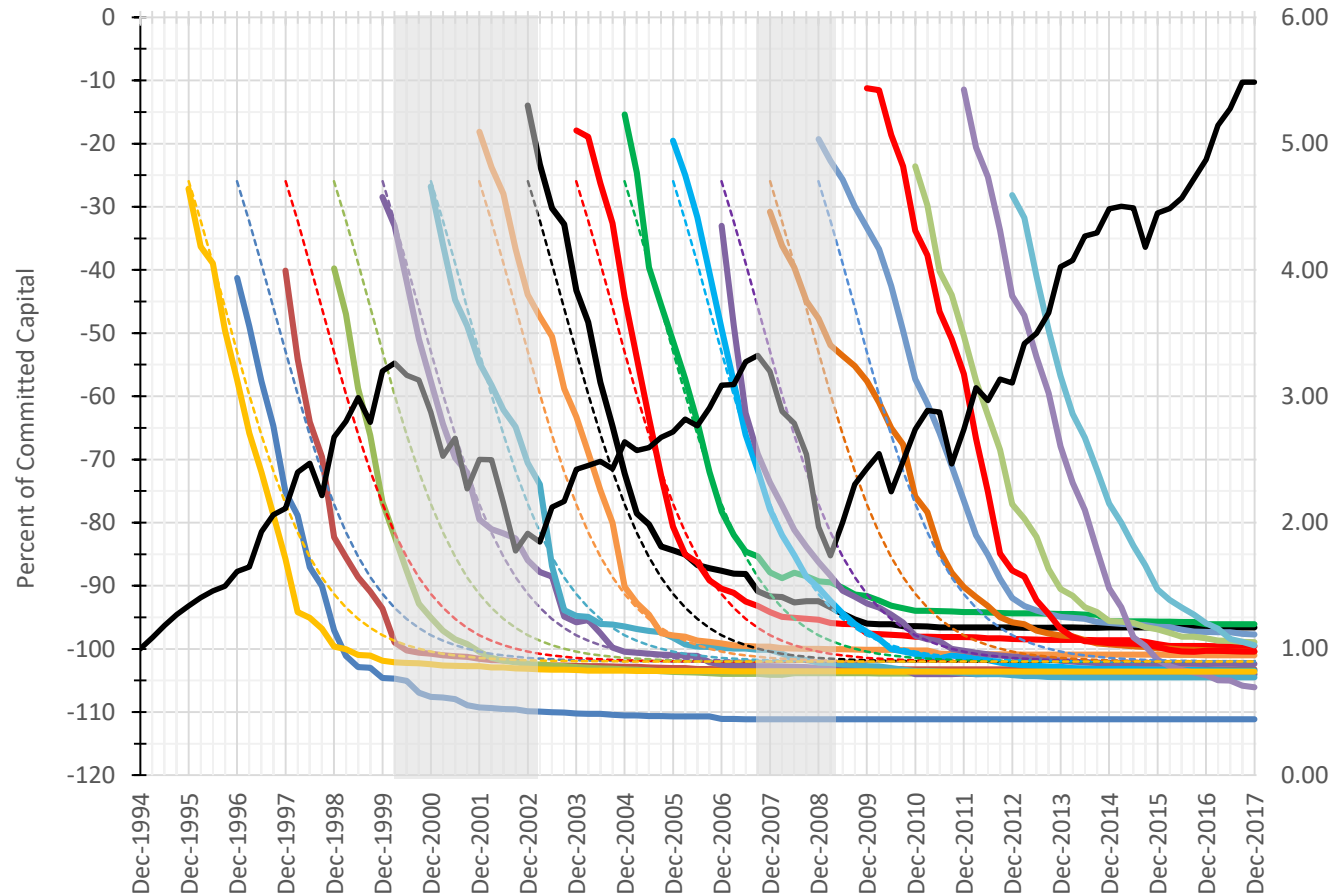


- ❖ Each line/color represents a vintage year (1995 to 2012)
- ❖ Horizontal axis is quarters from fund inception
- ❖ Dotted red line is the average across all vintage years



# Private Real Estate: As with PE Buyout, on average, Capital Calls do not accelerate during, or immediately after, market crashes

Similarly to Buyout, Real Estate fund capital calls tend to slow down during and immediately after market crashes and accelerate approaching pre crisis peaks

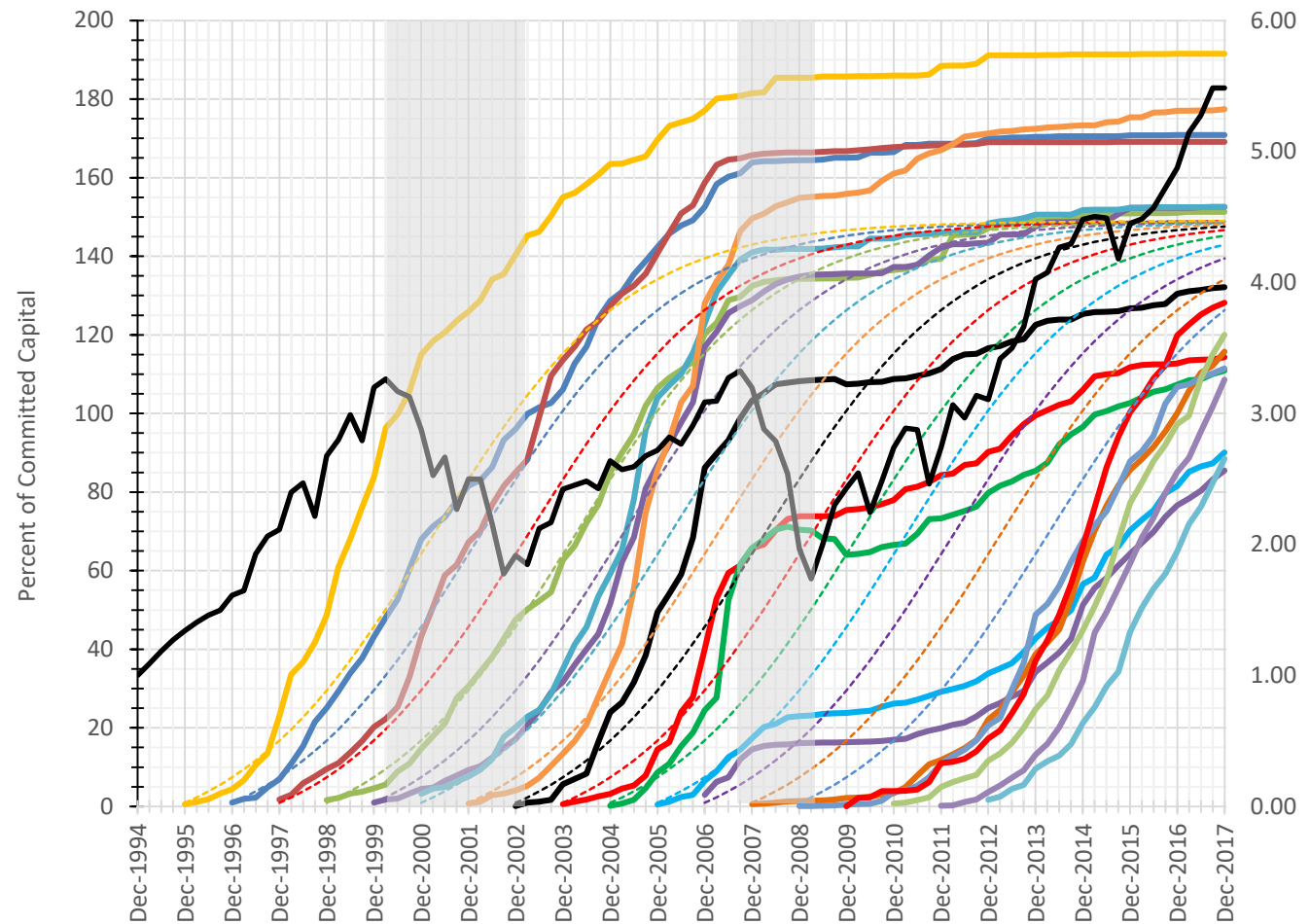


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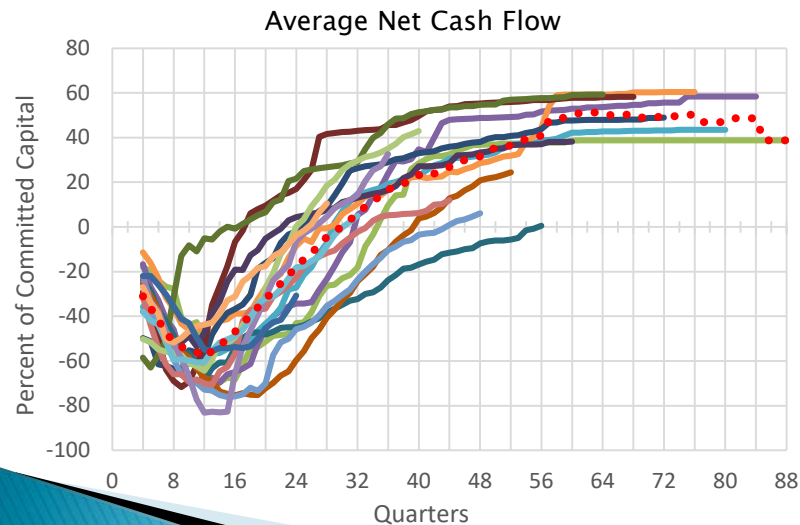
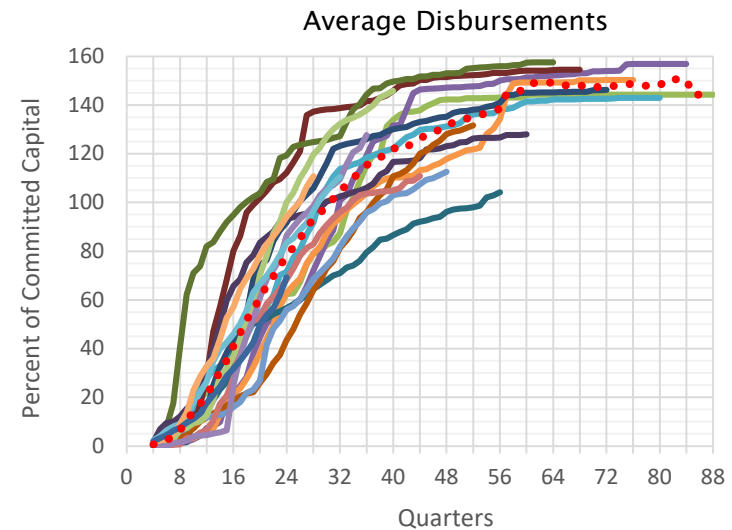
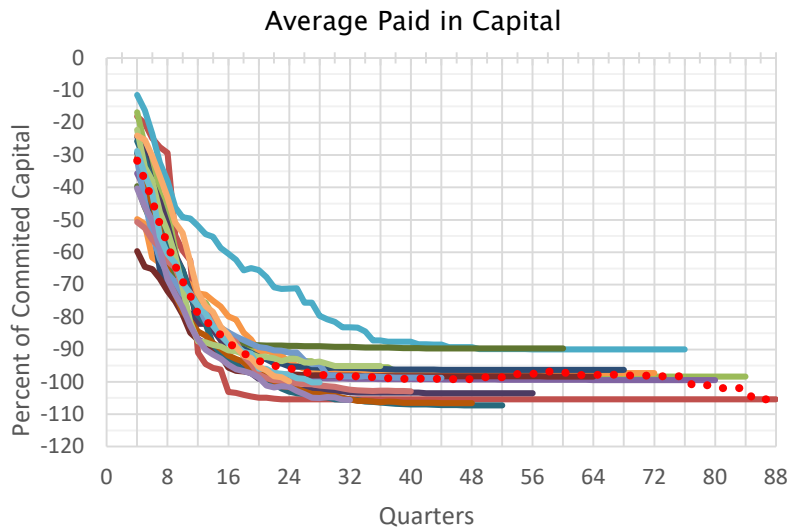
# Private Real Estate: Effect of Market Crisis on Distributions is highly dependent on nature of crisis

- ❖ Unlike Buyout, Real Estate fund distributions behaved very differently in the Tech Bubble crash and the Financial Crisis
- ❖ During the Tech Bubble crash, only the 1999 vintage year fell below the “average” distribution pattern
- ❖ During the Financial Crisis, distributions simply stopped and those vintage years that did somewhat recover took several years to do so



- ❖ Vintage Years are Solid Lines
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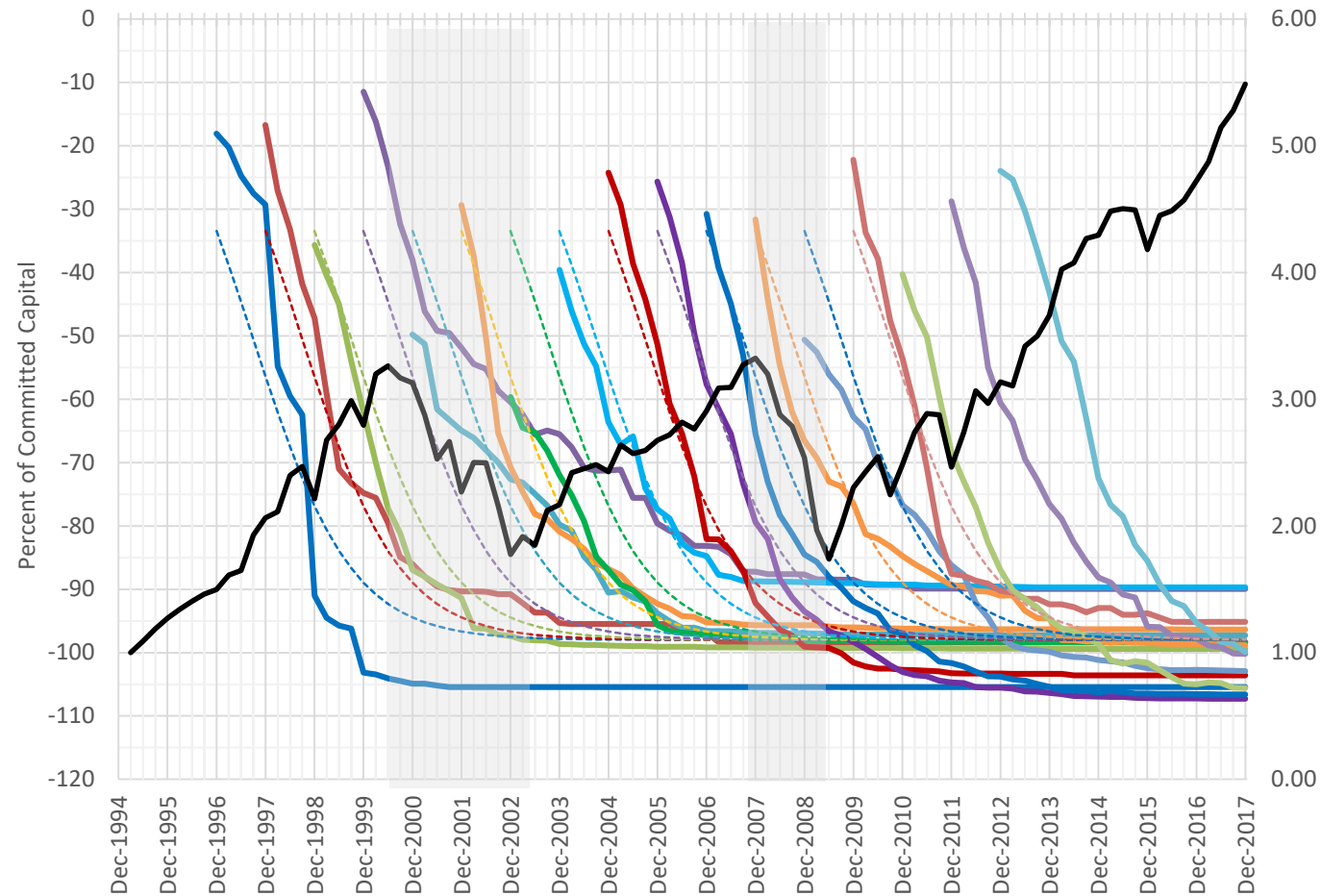
# PE Debt: Average Cash Flow Patterns



- ❖ Includes both Distressed and Special Situations
- ❖ Each line/color represents a vintage year (1995 to 2012)
- ❖ Horizontal axis is quarters from fund inception
- ❖ Dotted red line is the average across all vintage years

# Private Equity Debt: Average Called Capital does tend to accelerate during both crises

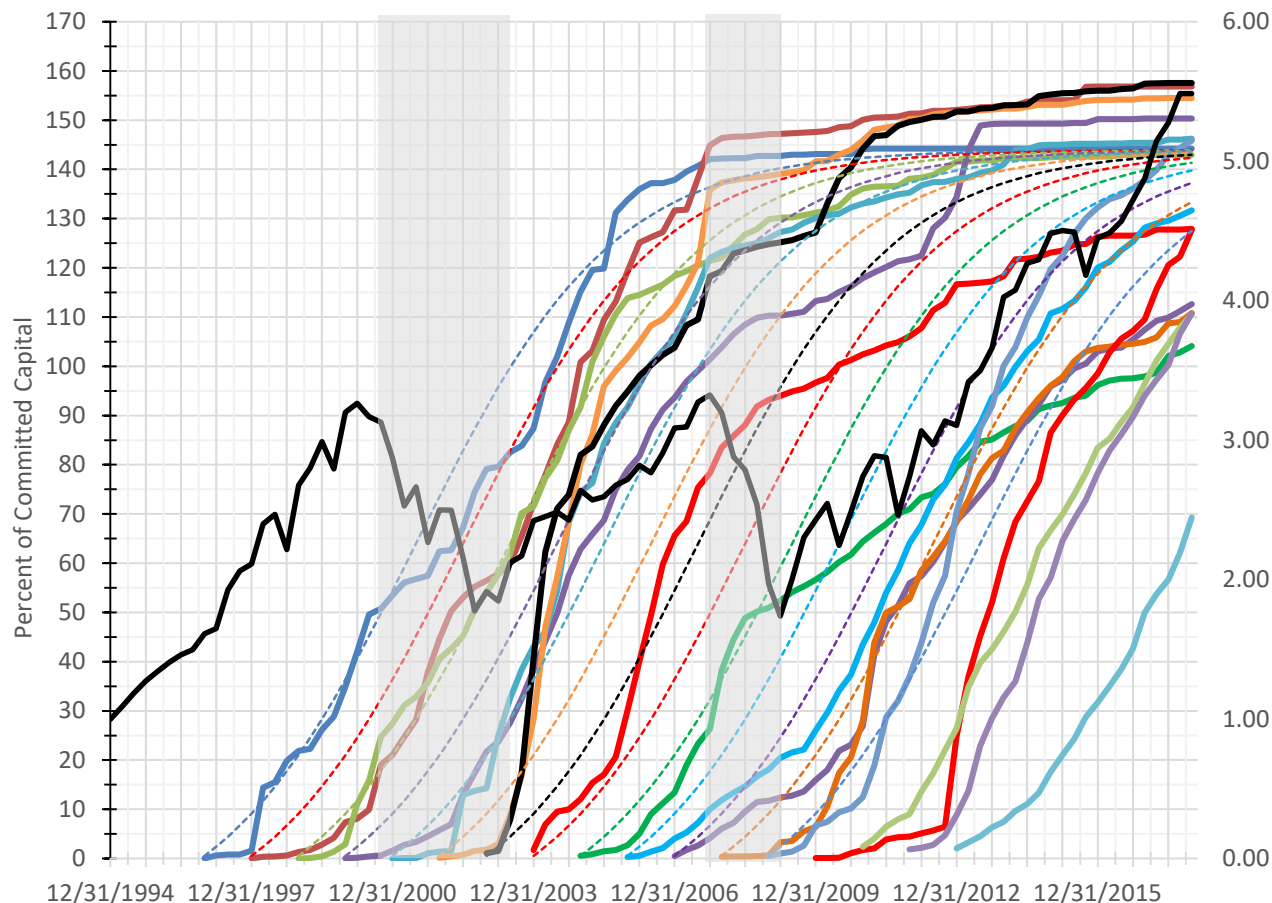
- ❖ Unlike both Buyouts and Real Estate, Debt fund capital calls significantly accelerated during and immediately after both market crashes
- ❖ In the Tech Bubble crash, the acceleration is seen primarily in the young vintage years



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# Private Equity Debt: Average Distributions slow down but to a lesser degree than for Buyout or Real Estate

- ❖ PE Debt Distributions were affected differently by the two crises and to some extent by the maturity of the vintage year
- ❖ The Tech Bubble crash had little effect on most vintage years and where it did, there was a quick recovery
- ❖ The Financial Crisis had a more significant effect, with older vintage years reacting late into the crisis but not recovering well, and younger vintage years reacting early but recovering quickly



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# TMRS IMPACT ANALYSIS SUMMARY

# Overview of TMRS investments in private market fund as of Q2 2018

Fund Type	% of Total Fund	Number of Funds	Capital Calls	Distributions
Open End	6.5%	9	\$68,585,542	15,853,677
Closed End	7.8%	76	\$242,008,238	\$33,270,232
Total	14.3%	85	\$310,593,780	\$49,123,909

In identifying the size of private market fund cash flow exposed to market crisis risk, there are several important observations:

- ❖ Over the next 12 months:
  - Capital Call exposure is about \$1.2 Billion
  - Distribution exposure is about \$0.2 Billion
- ❖ TMRS is not close to a “mature” private investment portfolio where distributions will be either equal to or greater than Capital Calls:
  - Currently, Distributions are just 16% of Capital Calls
  - Currently, private market funds are 14.3% of the total fund, whereas the target allocation is 30% (10% in Non-Core FI, 10 RE, 5% in Real Return, 5% PE).
- ❖ The size of private market fund cash flow exposed to market crisis risk will grow significantly in the next several years, particularly distributions

# Internal Analysis and Monitoring Conducted by Risk Management

## ❖ Cash Flow

- Records all private market fund capital calls and distributions
- Projects expected future fund cash flows for asset class pacing planning and total fund liquidity management
- Provides input to liquidity risk simulation model

## ❖ Account Allocation and Rebalancing

- Used by the CIO to review allocations and funding sources for new accounts

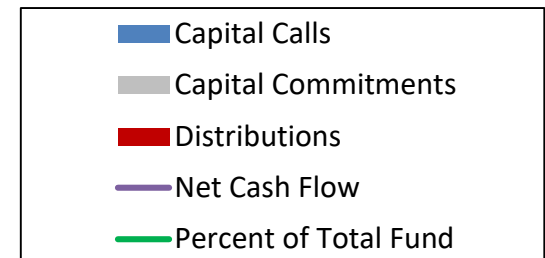
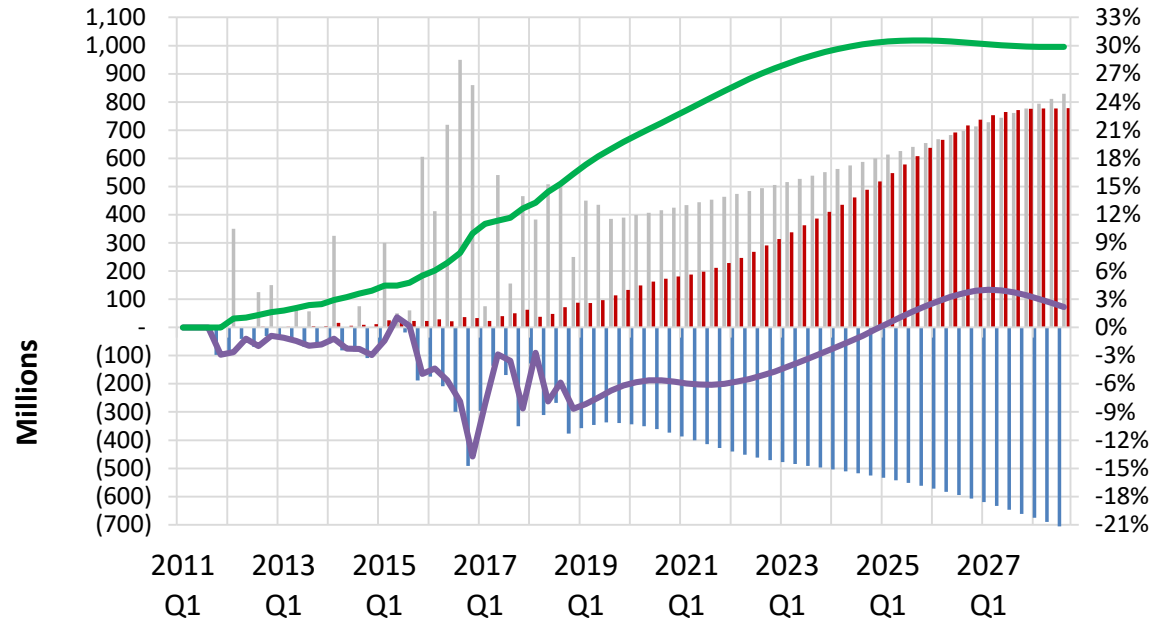
## ❖ Liquidity & Leverage

- Aggregates liquidity and leverage expectations for each account to the Total Fund level

## ❖ Asset Class Specific

- Risk reporting as appropriate
- Manager performance attribution analysis as appropriate

Cash Flow Model Quarterly Projections





# General Observations

- ❖ If there is a “general effect” it is a pause in both capital call and distribution activity
- ❖ There are exceptions to this “general” effect and significant differences in the degree of effect based on market/strategy and on the nature of the crisis
- ❖ The exception to the “general effect” is Private Equity Debt Capital Calls which accelerated during and following both the Tech Bubble crash and the Global Financial Crisis.
- ❖ The strongest, and most dramatic, effect was that of the Global Financial Crisis on Real Estate and Private Equity Buyout where Distributions essentially stopped for periods of a year or more.
- ❖ As a worst case scenario, during and immediately following a significant financial crisis, we should be prepared to handle a 100% increase in PE Debt capital calls and a stop in distributions for a 12 month period.
- ❖ Over the next 12 months, the worst case scenario, would be an increase in net cash flows to private market funds of approximately \$300 million ( $\$49 \text{ million} \times 4 \text{ plus } \$310 \text{ million} \times 0.1 \times 4$  where PE Debt like funds are assumed to be 10% of the total private funds)
- ❖ Two years from now, the worst case scenario increase in net cash flows would be just over \$1 billion; five years from now just over \$2 billion



# Staff Plan of Action

- ❖ Let cash level increase in a segregated account using a custodial STIF vehicle or mutual fund as currently allowed by IPS
- ❖ Evaluate the need to adjust the Target Cash level in this year's Asset-Liability/Asset Allocation study.

# Appendix

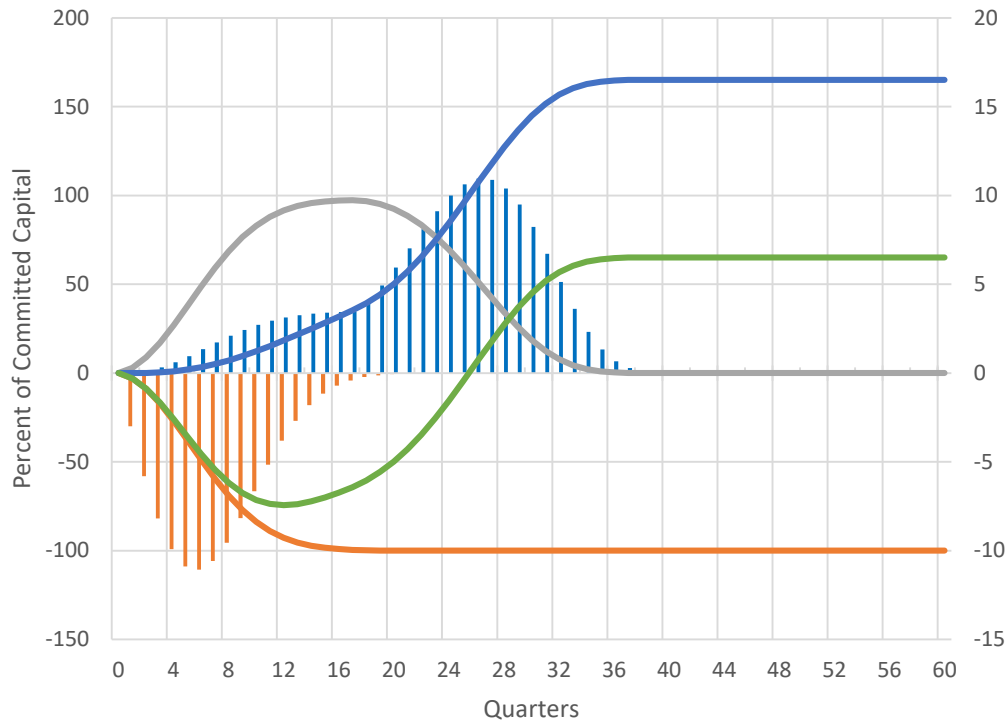
### Note regarding the use of average vintage year cash flows

- ❖ Using average vintage year cash flows (by market and strategy) is appropriate for estimating the average behavior of a portfolio of vintage year investments
- ❖ If the number of vintage year investments in the portfolio for a given market/strategy is very small, applying behavior observed in average vintage year cash flows is questionable
- ❖ We have not significantly explored the variation, in response to market crisis, between cash flows of funds within a vintage year. cursory examination suggests similar patterns of behavior

# Modified Takahashi and Alexander Model

- ❖ *“financial model that enables institutional investors to project future asset values and cash flows for funds in illiquid alternative asset classes . . . incorporates actual historical information to provide a base for forecasts ”* (ILLIQUID ALTERNATIVE ASSET FUND MODELING, Dean Takahashi and Seth Alexander, Yale University Investments office, January 2001)
- ❖ We have made some changes, but since the basic concept remains the same we recognize the original model
- ❖ Net Asset Value:  $NAV_{(t)} = [NAV_{(t-1)} * (1 + G)] + C_{(t)} - D_{(t)}$  where:  
G Annual growth rate (%)
- ❖ Distributions:  $D_{(t)} = RD_{(t)} * NAV_{(t)}$  where:  
 $RD_{(t)} = \text{Max} [Y\%, \text{IF } (B=0) \text{ THEN } 0\% \text{ ELSE } \text{Min}((t/L)^B, 100\%)]$  The “IF” statement allows for the realization rate to be set to zero by setting B=0  
 Y% = Yield (%)  
 B = Pacing Rate Curve Exponent  
 L = Life of the fund (years)
- ❖ Capital Calls:  $C_{(t)} = \text{IF } (t < IP) \text{ THEN } RC_{(t)} (CC * L - PIC_{(t)}) \text{ ELSE } 0$  where:  
 $RC_{(t)} = \text{Rate of contribution for time period } t = 2 / (1 + \text{EXP}(-\lambda t)) - 1$   
 L = level (percent of capital we expect to be called, can be less than or greater than 100%)  
 $\lambda$  = steepness  
 CC = Capital commitment  
 $PIC_{(t)}$  = Paid in Capital at end of time period t  
 IP = Investment Period (years)

# Model Parameterization For A Hypothetical Fund



## Model Parameters

- ❖ Capital Calls
  - Level (L) = 1.00
  - $\lambda$  (steepness) = 0.06
- ❖ NAV
  - Capital Growth Rate % (G) = 14%
- ❖ Distributions
  - Life (L) = 10 years
  - Pacing Rate Curve Exponent = 4
  - "Yield" = 15%

■ Capital Calls (right axis)   
 ■ Distributions (right axis)   
 — PIC  
— NAV   
 — Distributed Capital   
 — Net Cumulative Cash Flow