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Equity Risk Premium in the Aftermath of COVID-19 Pandemic: A Treasury Market Perspective

Projeto Final Monografia II - Versão Preliminar

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Justifying Theme Change

The decision to change the project's theme (initially *Analyzing the sharp decline in Equity Risk Premium since COVID-19 Pandemic*) was made based on the understanding that an analysis on the Equity Risk Premium in its entirety would be incomplete without equal scrutiny of the two measures it derives from: the expected return of an investment in stocks and the return of a risk-free investment. In this regard, considering that the decline of ERP to its lowest level since 2007 coincided with US Treasury Yields reaching levels last seen in 2007, it seems adequate to focus the analysis specifically on the decline of Equity Risk Premium from the perspective of Treasuries. In conclusion, the final aim of this modification is to preserve the credibility of the analysis without compromising the robustness of the obtained results.

Abstract

Since the COVID-19 pandemic, the Equity Risk Premium has fallen sharply. While historical evidence suggests that this premium typically follows a descending trend over time, the abruptness of this decline has taken place amidst an unusual upsurge in Treasury yields. Therefore, the aim of this thesis is to expose and analyze potential drivers of this decline from the perspective of the Treasury market.

Keywords

Equity Risk Premium; COVID-19; Treasuries; Monetary Policy; yields.

CONTENTS

1 Acknowledgements

Words cannot express my gratitude to my parents, who have always invested in my education and supported me throughout this journey. I am also grateful to my classmates, who I am honored to call friends, for helping turn my time in PUC-Rio into the best I could have ever hoped for. Additionally, I want to express my profound thanks to my amazing professor, Maria Claudia Gutierrez, who not only advised me in the making of this work but, most importantly, reassured me through her exceptional teaching that I had made the right choice of course. Lastly, I want to thank the Department of Economics for providing unwavering support to students throughout our journey to become economists.

2 Introduction

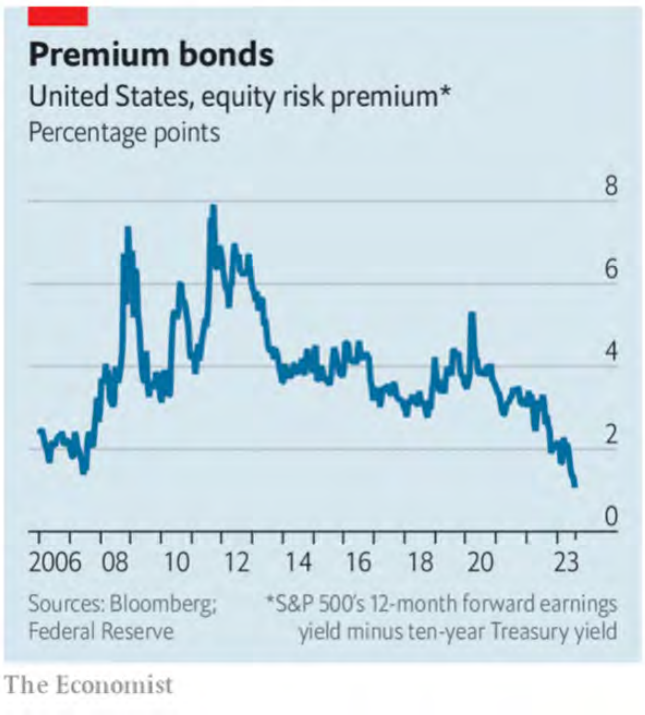
One of the main premises of the Efficient Market Theory (Fama 1991) relates to the rationality of agents. Although such rationality may be questioned in multiple spheres of the economy, this premise is sufficiently reasonable when it comes to the requirement of higher returns vis-à-vis greater risk, that is, the demand for a risk premium. In short, a situation in which agents choose to incur higher risk when they can obtain similar returns through a less volatile investment is at the very least unusual.

The abundance of available data creates a favorable environment for the development of an extensive literature on the subject at hand. Damodaran (2019), without ignoring the inherent limitations of various methods for estimating the equity risk premium relative to T. Bills and T. Bonds, estimated a series spanning from 1926 to 2018. In this regard, as evidenced in Figure 1, the results obtained by calculating the geometric mean of stock and treasury returns and those obtained by the arithmetic mean – each methodology with its own merits and limitations – are positive and follow the same downward trend. Since both approaches share the central result that will be pivotal for the purposes of this study, the need for a deeper discussion on which methodology is ideal for estimating the average return of stocks and treasuries is disregarded.

Source: Damodaran (2019)

The chart above reveals two relevant pieces of information: the existence of a historical and positive risk premium and the decrease of this premium over the years. While the first point supports the theoretical arguments highlighted in the first paragraph, the second one could be derived from other determining factors of the risk premium, such as the development of the capital market, for example. In this sense, neither of the above conclusions is sufficient to challenge the premise of agents' rationality regarding the demand for higher returns in the face of greater risk.

Although for a longer time horizon, the decreasing trend of the risk premium can be explained by structural changes, this argument does not seem to provide a reasonable explanation for the sharp decline in the Equity Risk Premium observed since the end of the pandemic. In this regard, as this sudden drop coincided with a surge in US Treasury yields, reaching levels last seen in 2007, acknowledging the existence of a causal link between these events seems more adequate than attributing the decline to agent's lack of rationality. In light of this, the aim of this work is to understand, based on the extensive literature available, the factors that may have lead to the sharp upsurge in Treasury yields and consequent decrease in the Equity Risk Premium.



Source: "American stocks are at their most expensive in decades" (2023)

Source: **Financial Times**

3 Motivation

Naturally, the subject at hand has not gone unnoticed and has been the focus of increasing academic interest. However, it is common for these publications to adopt an approach that restricts readers to a single point of view. In this regard, despite the undeniable quality of these works, the public ends up being deprived of a broader view of the issue, as well as a deeper understanding of its real complexity and nuances.

Therefore, the main motivation of this work is to unravel, based on the vast available literature and without and without constraining the topic through an overly simplistic approach, the drivers behind the plunge of the Equity Risk Premium, from a Treasury yield perspective. With this aim, the paper starts by elucidating the relationship between the Equity Risk Premium and Treasury yields, subsequently shifting the focus to the yield components. Afterwards, a thorough analysis of the economic forces that impact these parts will be conducted. Finally, using the framework developed throughout the previous steps as a tool, we will arrive at a well-founded conclusion regarding the causes behind the sharp increase in Treasury yields and the consequent reduction in Equity Risk Premia.

Hopefully, this work will not only be able to elucidate the reasons behind the current Treasury yields dynamics, but, most importantly, to equip the reader with a sufficient understanding of economic theory and the current economic landscape to draw their own conclusions on the matter.

4 Literature Review

Reviewing literature is a crucial step in establishing the necessary theoretical foundation for evaluating the theses that will be presented later. Without a thorough understanding of Treasuries, it is impossible to properly address one of the most significant downward trends in the Equity Risk Premium, fueled by a steep increase in Treasury yields. Therefore, for the purposes of this paper, we will first delve into the academic literature surrounding these instruments — a more expository phase —, to then assess the economic context in which we find ourselves and adopt a more argumentative approach.

4.1 Understanding the Connection Between Equity Risk Premium and Treasury Yields

Initially, comprehending the rationale behind the higher expected return of stocks in comparison to bonds is straightforward when analyzing their equity and debt essences. While bondholders possess a contractually secured right to receive a predetermined amount, stockholders, by having a claim on a firm's earnings, are exposed to greater risk, whether for gain or loss. Therefore, in line with the premise of agent rationality, it is only natural that stockholders would seek higher returns for incurring greater uncertainty. ("American stocks are at their most expensive in decades" 2023)

Whereas, beyond textbooks, assuming that all debt securities are paid in practice is a rather strong assumption, this hypothesis is not as robust when the debtor is the US Treasury. Hence, when the benchmark used to define the risk-free rate for the American market is Treasuries' return rate, the theory deviates little from practice.

The Capital Asset Pricing Model (CAPM) puts the relationship exposed above into a financial model:

$$ER_i = R_f + \beta_i(ER_m - R_f)$$

where:

ER_i = expected return of investment

R_f = risk-free rate

β_i = beta of the investment

$(ER_m - R_f)$ = market risk premium

Source: **Investopedia** (Kenton 2023)

Considering the historical returns of the S&P500 as a proxy for stock returns, it is reasonable enough to consider the beta of the CAPM equal to 1, indicating a perfect correlation with market risk. Therefore, the Equity Risk Premium can be defined as the difference between the return rate of Treasuries (the risk-free rate) and the expected return of the S&P 500.

4.2 Decomposing Treasuries Yields

In order to accomplish the objective of this paper, which is to unfold the drivers behind the recent upsurge in Treasury yields and its implications for the Equity Risk Premium, it is necessary to delve deeper into its determinants.

The Treasury Yield Premium Model by Jens H.E. Christensen and Glenn D. Rudebusch (CR) [1] and featured in the San Francisco FED's working paper series [2], breaks down the nominal yield curve into two fundamental components: the expected short-term interest rate, determined by the expected real rates and inflation expectations, and a term premium, which can be understood as a compensation demanded by investors for bearing the risk associated with investing in longer-maturity bonds instead of sequentially reinvesting the principal in short-term securities.

[1] (Christensen, Diebold, and Rudebusch 2011) & (Christensen and Rudebusch 2012)

[2] (*Treasury Yield Premiums - San Francisco Fed* 2023)

Source: *Treasury Yield Premiums - San Francisco Fed* (2023)

While the impact of the observed monetary shocks on Treasury yields through the expected short-term interest rate channel seems more objective, understanding their effect through the term premia can be less straightforward due to the broader definition of this component, which involves investors' perceptions of risk [3]. Therefore, the next step in this analysis is to identify the risks associated with holding longer-duration bonds, to later explore the impact of monetary shocks and the macroeconomic outlook on them.

A logical starting point would be to consider the more consensual risk factors associated with investing in longer-duration securities: exposure to unexpected inflation and unforeseen short-term interest rates changes (Cohen, Hrdahl, and Xia 2018).

Initially, to properly understand the interest rate risk to which longer-term Treasuries are exposed, it is important to explore the relationship between interest rates and bond prices. To this end, one should understand how bonds and other assets that generate future cash flows are priced.

Fundamentally, the value of an asset should reflect all future cash flows that it is expected to generate (Fisher 1907). While forecasting these future flows can be

[3] *Estimation of the term premium in Euro Area government bonds — EUTERPE Project — Fact Sheet — H2020* (2024)

more challenging for variable income securities, it is relatively straightforward for Treasuries, with their predetermined coupon rates and face values. In this regard, their price can be calculated by discounting all their future cash flows to their present value using a discount rate that reflects the time value of money.

$$\text{Bond Value} = \frac{C}{1+r} + \frac{C}{(1+r)^2} + \ldots + \frac{C}{(1+r)^n} + \frac{F}{(1+r)^n}$$

Where:

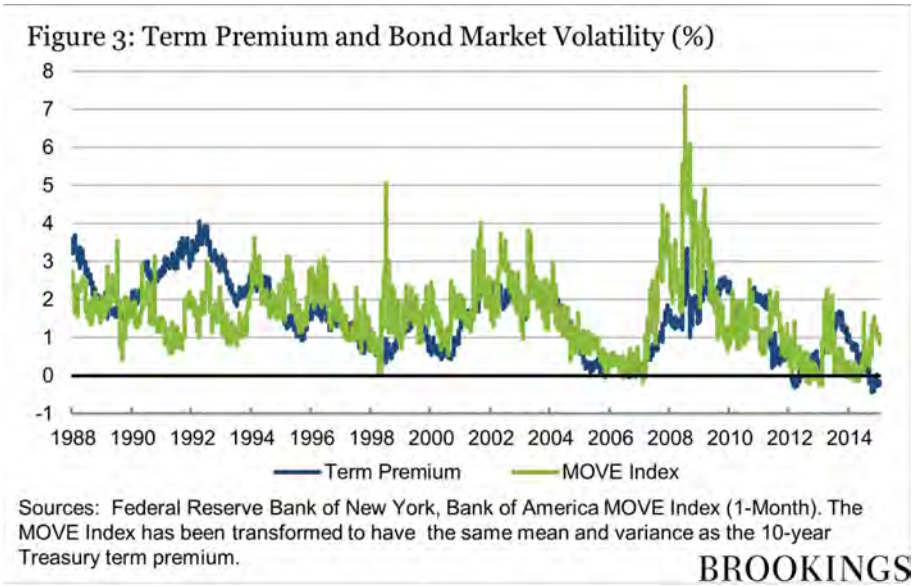
- C = periodic coupon payment
- r = required rate of return (yield to maturity)
- n = number of periods (usually years) until maturity
- F = face value (or par value) of the bond

Source: **Investopedia** (Hayes 2024)

From the equation above, it can be concluded that, all else equal, bonds with longer maturities have higher price sensitivity to swings in interest rates. This heightened sensitivity arises because, when interest rates rise, the present value of future cash flows for longer-term bonds is more impacted by the higher rates than those of shorter-term bonds. Consequently, investing in longer-term securities entails two inherent risks: effectively predicting the interest rates path for the life of the bond and facing increased price sensitivity to changes in interest rates.

The chart below provides insight into the correlation between uncertainty about future rates and the term premium (Bernanke 2015). The Merrill Lynch Option Volatility Estimate Index (MOVE Index)[4], by estimating the implied volatility of US Treasury options prices across various maturities, is able to capture the expected fluctuations in interest rates. As such, it serves as a reliable proxy for the bond market's overall sentiment regarding future movements in interest rates.

[4] ("MOVE Index" n.d.)



Source: **Brookings (Bernanke 2015)**

As for the inflation risk, the primary concern in the investment process are the real expected returns, which are affected by inflation. Hence, if prices take a path different from what was previously estimated, investors may experience lower real returns than anticipated. In this sense, the longer the maturity of the Treasury, the longer the forecast horizon must be, thus making a challenging task even more daunting.

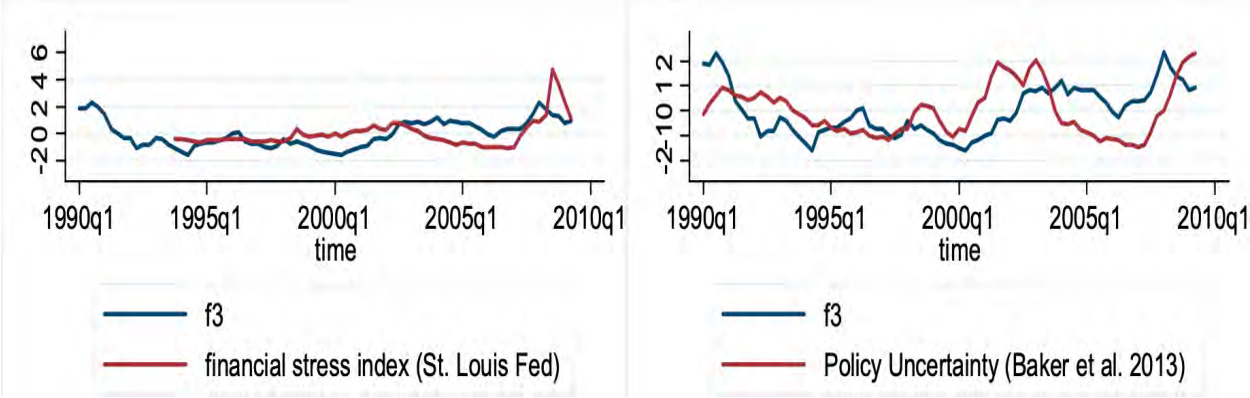
Additionally, another risk that should be assessed as a potential driver for the term premium is the uncertainty on the evolution of the supply/demand balance (Cohen, Hrdahl, and Xia 2018).

The theory that individuals have a preference for holding liquid assets over illiquid ones, was first introduced by (Keynes 1936). In this perspective, both the expected yield to maturity (YTM) and the potential value from selling the securities at market prices before maturity are taken into account during the decision-making process. Consequently, if there is a general uncertainty on how their prices will evolve, which is influenced by the supply and demand for these assets, investors may demand a higher term premium.

Finally, it must be mentioned another element that may influence investors' perception of risk in holding longer maturity bonds. (Abbritti et al. 2013) estimate the impact of three global factors (global expected inflation, growth and a factor similar to a long-run risk factor) on the term premia across countries. According to their model, the third global factor, which is related to future financial and

economic instability, is accountable for around 60% of the total variance of the term premia at the end of the chosen time window (a 40-quarter horizon). This happens because monetary policy authorities usually respond to long-run risk factor shocks by changing short-rates, making the third global factor a relevant forecaster of the short-term yields sudden changes.

The chart below shows how the estimated third global factors bears a close relationship with the financial stress index published by the St Louis FED (left chart) and how it leads US index of economic policy uncertainty developed by (Baker, Bloom, and Davis 2016).



Source: Abbritti et al. (2013)

In summary, there are four main channels through which Treasury yields can influenced by: expectations regarding inflation and short-term rates, expected Treasury prices, which are shaped by the dynamics of supply and demand for these securities, and the level of uncertainty surrounding these all factors.The next step is to briefly explore the factors that may have impacted yields through these channels.

4.3 Introducing Potential Drivers Behind the Surge in Treasury Yields

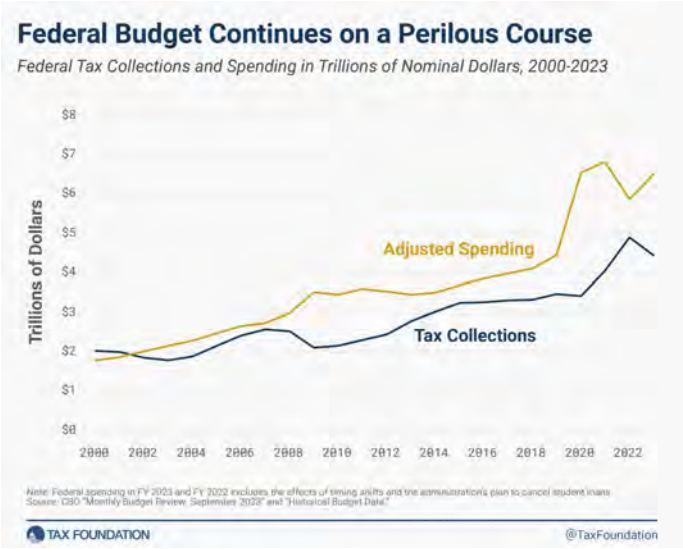
Typically, the main driver for demand among most investors lies in identifying opportunities that offer a desired balance between risk and reward. In this context, macroeconomic factors play a crucial role in shaping investors' views on the riskiness of an asset. For instance, in a scenario of high levels of inflation and sluggish economic growth, agents often perceive the potential rewards from stocks as out-

weighed by the associated risks, choosing safer alternatives, such as Treasuries. This movement, known as a flight-to-safety, drives up Treasuries prices, compressing their yields, while decreasing bond prices and widening their returns.

In this sense, in the aftermath of the Covid-19 pandemic, when interest rates had globally to be raised to curb peaking inflation, the logical expectation would be of a heightened demand for bonds. However, contrary to the obvious, stocks reached their highest valuation in decades, while Treasury yields surged, marking their top level since 2007 [5]. Consequently, in line with the relationship explained above, the equity risk premium plummeted [6].

While this chain of events deviates from the textbook, it is unlikely to be inexplicable. As a matter of fact, there are several theories of dynamics simultaneous to the observed event that may, individually or jointly, be behind the referred deviation. Without delving too deeply, the next step is to discuss some important facts that may be related to this phenomenon (Cudzil 2023).

First, the US government's growing budget deficit. Based on preliminary figures from the Congressional Budget Office (CBO), excluding the pandemic years, this year's FEDeral deficit is the highest in history (Hulehan 2023). Moreover, according to the IMF, it is set to surpass 8% of GDP, while between 1973 and 2022, the annual deficit has averaged 3.6% of GDP (McDougall 2023).



Source: **Tax Foundation**

[5] (*Strong US economy forces investor rethink on interest rates* 2024)
[6] ("American stocks are at their most expensive in decades" 2023)

To sustain this amount of spending out of the budget, the government has been issuing an increasing volume of bonds, resulting in an oversupply in the market (McDougall 2023). Additionally, there has been growing concerns among investors regarding US high level of indebtedness. In this context, Moody's and Fitch have recently lowered their outlook on the country's credit rating, citing large fiscal deficits and a decline in debt affordability (Barbuscia, Shalal, and Barbuscia 2023).

Second, the resilience of the American economy. Despite monetary tightening efforts and against expectations, US economy remains strong, with October's data from the Bureau of Labor Statistics showing non-farm payrolls up 150,000 and low unemployment (Llewellyn 2023). In this scenario of resilience and lower recession risks, markets could be pricing in the prospect of tighter financial conditions and a reduction of the Central Bank's balance sheet, which is perceived as a potential boost in Treasuries supply.

Third, a lower demand for Treasuries from foreign markets. Historically, international demand for US Treasuries has represented an important share of this market. Worldwide, entities from private and official sectors have made US debt securities a prime investment choice, whether because of its "safe-haven" nature, high liquidity or FX control and other monetary policy reasons. However, since the end of the Covid-19 pandemic, foreign investors have considerably reduced their activity in this market, a change that has raised several conjectures.

A popular theory attributes this trend to the increase in transaction costs associated with investing abroad. This happens because, beyond simply selecting a foreign asset, investing abroad also means investing in the currency in which the security is denominated. In this regard, the investment process becomes a far more complex task, as a favorable return on the security might be offset by undesirable swings in the exchange rate. Moreover, even investors who choose currency-hedged investments aren't entirely shielded against sudden FX movements, as witnessed since the end of 2022 (Benhaim 2023).

Another potential explanation is that, as other "safe" economies are in same path as the US to slow down economy, investors now have a broader array of alternatives when choosing safe investments. In light of this, the looming of other appealing investment options within developed economies intensifies the competition in the global financial market and weakens the foreign demand for Treasuries.

A notable example is the Bank of Japan, which eased its yield curve control, leading to the increase of Japanese government bonds yields. Although these higher

yields are not comparable to US Treasuries' returns, Japanese bonds become more appealing when considering the impact of foreign exchange rates and currency-hedging costs. Within this scenario, according to S&P Global, Treasury holdings by Japanese investors — the largest foreign holder of US Treasuries securities — fell 18.5% YoY in November 2022 (Brennan 2023).

Finally, there is the impact of US monetary tightening in other economies. Naturally, the rise in fed fund rates that took place over 2022 and 2023, has not been limited to America's economy. The higher rates in America have produced wide-ranging consequences abroad, affecting foreign exchange rates, inflation, and monetary policy. In this regard, the reduction in the Treasury demand from these economies could be a logical consequence of how America's internal monetary policy reverberated overseas.

Figure 1 – Federal Debt Held by Foreign and International Investors

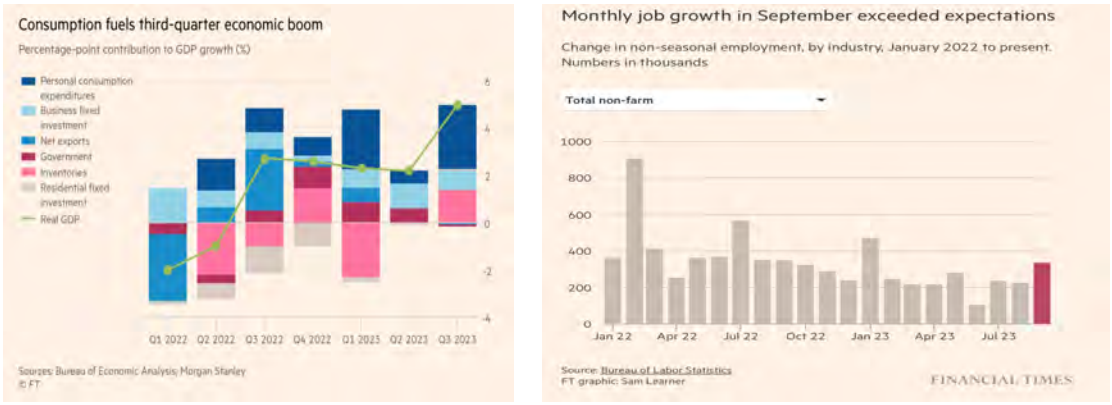
Source: **Fred Data**

Once clarified how Treasury returns impact the Equity Risk Premium, explored the channels through which Treasury Yields are affected, and briefly mentioned the potential drivers of the Treasury Yield upsurge, it is time to delve deeper into them.

5 The resilience of American economy

Despite Fed's efforts in bringing inflation back to the 2% target by rising rates to a 22-year high (Roeder, Xiao, and Smith 2023), American economy responded with unforeseen resilience. While inflation did decelerate from its 2022 levels - nonetheless still with further to go to reach the target -, several data on economic activity have indicated an economy far from what would be expected after 11 consecutive rate hikes.

In terms of figures, by the third quarter of 2023, GDP growth jumped to highest rate in nearly two years. The primary force for this data was consumer spending, fueled by a healthy labor market.



Source: **Financial Times** (Roeder, Xiao, and Smith 2023)

"Too good to be true" seemed to be the general opinion among FED's Board members concerning a scenario of slowing inflation towards the target associated with a healthy economy (*Treasury Yield Premiums - San Francisco Fed* 2023). In this regard, the decision was to maintain rates steady while cautiously awaiting the economic momentum to wane, once the effects of quantitative tightening started to manifest within households and companies.

Amidst the rate hiking cycle and the lag between these hawkish measures and the initial signs of inflation consistently on its way to the 2% target, uncertainty among investors increased. The persistence of inflation above target fueled the perception that current prices moves could be a consequence of structural changes in the economy rather than cyclical ones, raising doubts about the appropriateness of the target's level. On this matter, Jamie Dimon, chief executive of JP Morgan Chase, pointed out that significant societal changes, such as the green transition, supply chain restructuring, rising health-care costs, and increased military spending

in response to geopolitical tensions, could lead "to stickier inflation and higher rates than markets expect" (Smialek 2024).

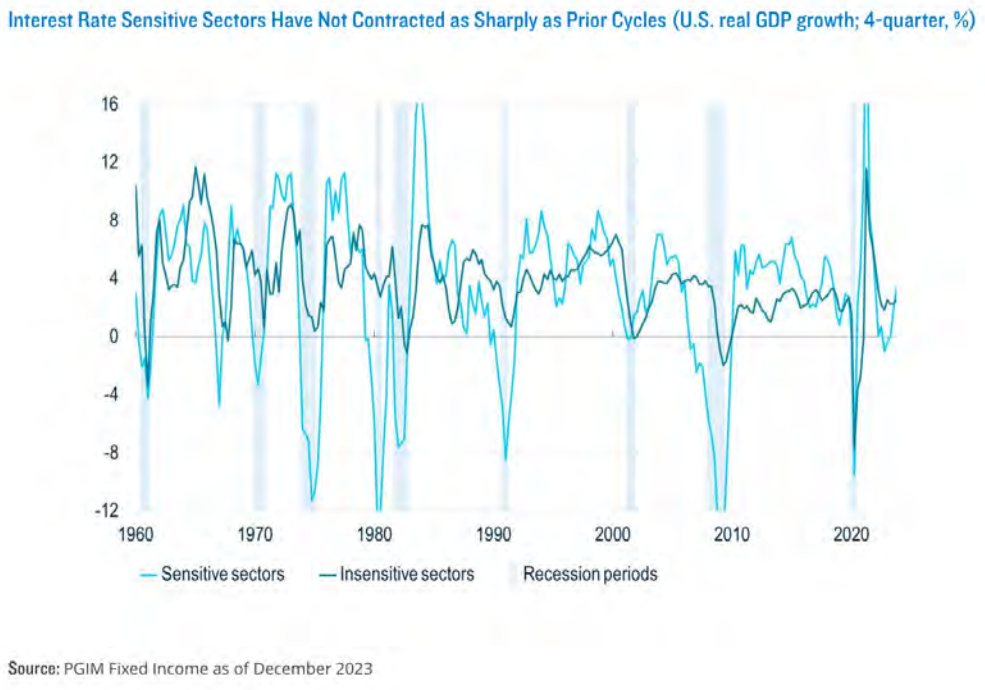
The subject of changing the inflation target typically arises in moments when the strength of monetary policy seems more likely to push the economy into recession and higher unemployment, than effectively reducing inflation (S. Derby 2023). This happens, because the longer it takes for the first signs that inflation is consistently on its way to the target to appear, the later the monetary authority starts cutting rates. Consequently, when the prolonged period of higher rates finally hit, there is a severe downturn in activity and possibly recession.

Nevertheless, rather than serving as a solution for the economy, changing the inflation target is more of a short-term political remedy, with potential to be harmful in the medium and long term. Grounded in empirical evidence, a broad literature highlights the pivotal role of inflation expectations in shaping actual inflation (Washington et al. 2022). In this regard, altering the inflation target at that moment could lead agents to think that the FED gave up entirely the battle against inflation, as the purpose of inflation targeting is to stabilize the public's expectations regarding price growth. Therefore, changing the target could jeopardize that objective by fostering expectations that it will be raised once more at the next sign of inflation resurgence (*Should central banks inflation targets be raised?* 2022).

Moreover, the remarkable resilience of the economy given the aggressiveness of the monetary policy, left many policymakers and academics worldwide feeling uncertain about what might unfold next. The general feeling was that the unprecedented nature of the Covid-19 pandemic shock and its repercussions could have fundamentally altered the economic landscape to the extent that conventional rules no longer seemed applicable. Naturally, a questioning prompted by this resilience was whether the relationship between growth and interest rates observed so far had somehow changed.

Within this spectrum, Felices, Porcelli, and Jiranek (2024) conducted a research on the evolving sensitivity of the US economy to interest rates and identified unique features of the pandemic which may have mitigated the impact of higher interest rates in 2022 and 2023. Their findings suggested that the positive supply shock resulting from healing supply chains, along with exceptionally high demand due to substantial fiscal stimulus and a shift in consumption patterns from services to goods, were among the factors that may have contributed to the observed change. Consequently, certain economic sectors historically sensitive to interest rates did not

exhibit the expected response to the hikes, contracting only by around 1% compared to contractions of up to 10-12% during previous instances of FED rate hikes.



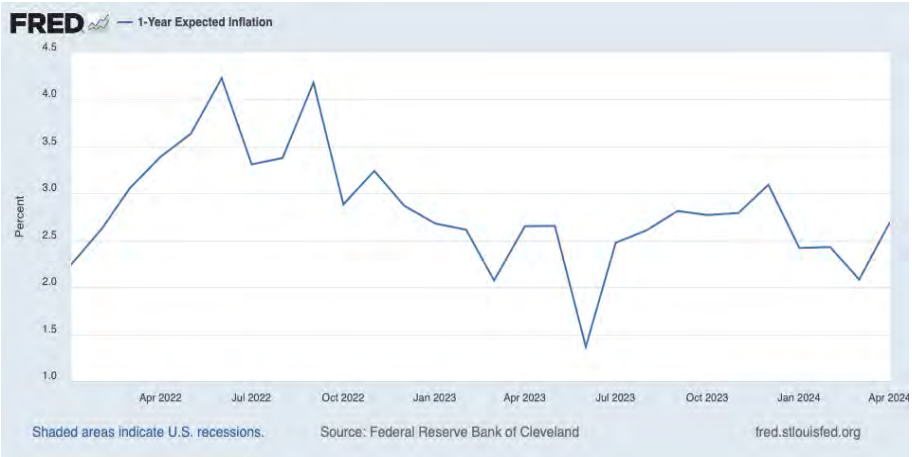
Source: **PGIM Fixed Income (Felices, Porcelli, and Jiranek 2024)**

Despite of all these uncertainties within markets mentioned above, Federal Reserve Chair, Jerome Powell, has remained committed in its decision to steer inflation towards the target, which has noticeably influenced consumers' inflation expectations. As a consequence, Fed's efforts to anchor inflation expectations thorough a solid Forward Guidance policy had visible pay-off.

Focusing on the implications of these events on Treasury yields, the ACM model (Adrian, Crump, and Moench 2012) employed by the New York Fed to estimate the Treasury Term Premium, indicates that from September 2021, the increase in yields was mainly attributed to an upward revision in expectations of future short-term rates. Throughout this period, the term premium stayed relatively restrained, oscillating within a range of zero to minus 100 bps.

However, following the Federal Reserve's consecutive rate hikes and forward guidance policy, a significant shift occurred by July 2023. According to the model, the observed 95 bps increase in the 10-year Treasury yield was entirely attributed to a significant rise in the term premium during the same period. Moreover, the ACM

Figure 3 – 1-Year Expected Inflation



Source: **FRED Data**

model's estimate revealed a decline in interest rate expectations over the lifespan of the 10-year Treasury notes since the September FOMC meeting (Wong 2023).

Source: **10-Yr Treasury Yield vs Term Premium (2020-2023) Wong (2023)**

Source: **10-Yr Treasury Yield vs Term Premium (07/23-09/23) Wong (2023)**

Hence, building upon the previous analysis of the drivers behind Treasury yields, it can be inferred that the recent increase in yields is predominantly attributable to the term premium component ("Bond-Market Volatility Is About the Term Premium, Powell Says" 2024). In this sense, the following step is to assess the variables that may be impacting this factor.

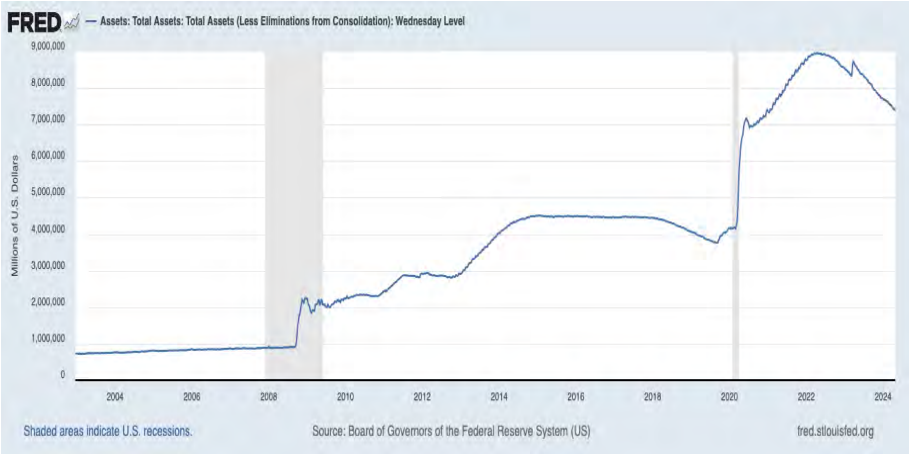
6 Historical Term Premium

While the definition of the Term Premium has been explored in the previous chapter, gaining a thorough understanding of this component requires an analysis of its historical behavior, as real-life often diverges from textbooks. In this context, relying on the rule of thumb that defines it as the extra compensation demanded by investors for the risks associated with longer-term bonds seem of little help, considering that, in reality, the Term Premia has not always been positive. As a matter of fact, prior to the current market dynamics, it had been negative or near zero for a while.

Essentially, a negative Term Premium means that investors are being undercompensated for long-horizon risks inherent to longer-maturity investments (Tang, Li, and Tandon 2019). As such, a 10yr yield is no more than the average of the expected path for short-term rates in the next 10 years (Garvey and Schroeder 2024). Within this framework and considering the general drivers of the Term Premium mentioned earlier in this paper, one could hypothesize which forces had been dragging this variable down and what has changed since.

Scott (2022) focus on the repercussions of the Federal Reserve's Quantitative Easing in 2008, and later the large-scale asset purchases in response to the Covid-19 pandemic. Both of these initiatives involved significant purchases of US Treasuries with the explicit objective of reducing longer-term yields. Moreover, in the two cases, the acquisitions were made regardless of the yield and expected return on Treasuries.

Figure 4 – Fed: Total Assets



Source: **FRED Data**

Additionally, as a result of lower yields driven by Central Bank's higher demand for government securities, numerous marginal investors were prompted to seek higher returns elsewhere. In this context, emerging economies with higher rates became a central destination to the capital previously allocated in Treasuries. In this process, the exchange rates from this economies began to appreciate beyond desirable levels, posing a threat to their core economic activities. Consequently, local central banks chose to stabilize their exchange rates, safeguarding their exporting sectors, and to accumulate reserves by investing in US Treasuries. Once again, for the purposes of their local monetary policies, the Treasury purchases manifested in a risk-indifferent manner, with a lack of concern on their yields and returns.

Source: **FRED Data: Debt Held by Foreign Investors**

Thus, it is clear the existence of a relationship between Fed's holding of Treasuries, which reflects the monetary policy in course, and the Term Premium. While, under normal circumstances, the demand for riskier securities with no premium to compensate would be irrational, when the purchase of Treasuries is part of the monetary policy effort, the dynamics change.

In this context, to validate this hypothesis, Scott (2022) created a model to determine whether there is a strong statistical relationship between these two variables. His findings indicate that although both series are not mean-reverting, the risk premium tends to drift in the direction implied by official sector holdings, which strongly suggests a causal or structural relationship between the two. Accordingly, it provides a solid foundation for making inferences about potential changes in Federal Reserve holdings and their subsequent impact on the risk premium in the future.

Source: **Schroders**(Scott 2022)

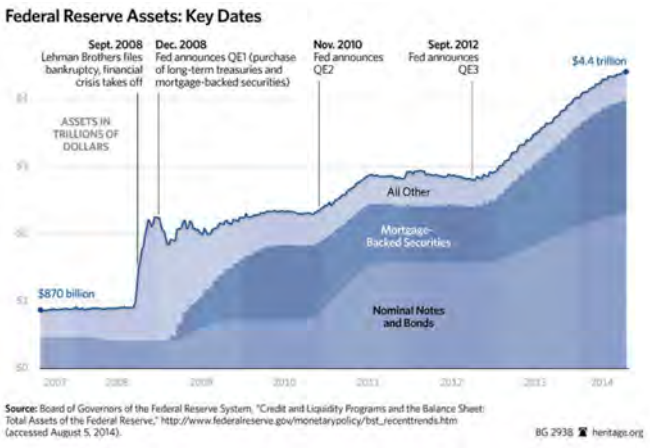
7 Fed's Balance Sheet Reduction

Comprehending how the term premia reached such low levels levels in the past, sheds light into the original goal of this chapter, which is understanding what has driven the premium up.

Firstly, it is important to highlight the consequences of the Federal Reserve's balance sheet shrinking process. In contrast to the Treasury purchases that took place in some moments of the past two decades, since June 2022, the Fed has been engaged in the reverse process, passively shrinking its assets as those securities "roll off" without being replaced (Sablik 2022).

Beyond merely contributing to bringing inflation back to the 2% inflation target, the reduction of Fed's balance sheet stands as a goal on its own: managing risk. This handling has grown more necessary as, over the past decades, due to a series of Quantitative Easing (QE) operations, Fed's balance sheet has become more exposed to interest rate risk.

In terms of figures, between the start of 2008 and the end of 2014, the balance sheet of the US central bank swelled from $900 billion to $4.5 trillion, primarily driven by the accumulation of long-term US Treasury notes and bonds (Carvalho et al. 2019). Moreover, during the initial stages of the Covid-19 pandemic, the Fed expanded its assets portfolio by acquiring an additional $1.5 trillion in Treasuries. Within this scenario, as interest rates rise due to the monetary tightening, the risk associated with these holdings is magnified, leading to a situation in which its liabilities increase while the rates on its assets remain predominantly fixed.



Source: *Quantitative Easing, The Fed's Balance Sheet, and Central Bank Insolvency* (2015)

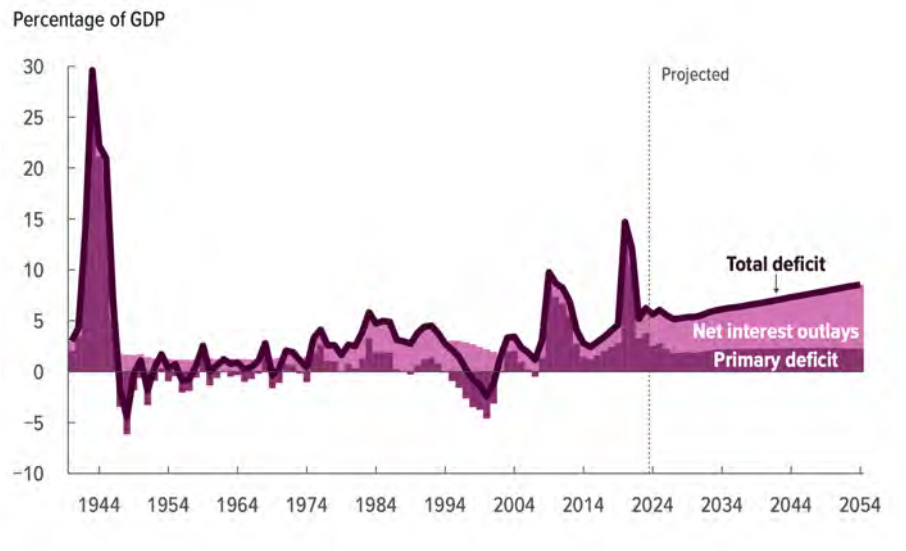
As a consequence of this cumulative schemes aimed at easing monetary conditions over the years, by March 2022, Fed's holdings of Treasuries totaled around $5.8trn, a quarter of the amount issued (*The Fed's balance-sheet is about to shrink. Wall Street is not ready* 2022). In this context, in May's 2022 FOMC Meeting, Fed's Board announced it would begin to shrink its securities holdings, letting bonds mature.

Source: **Financial Times**

In conclusion, the Federal Reserve's purchases of Treasuries for monetary policy purposes have been the main force behind the demand for Treasuries at reduced levels of term premium. Therefore, by passively letting Treasuries mature without replacing them with new ones, Fed not only forfeits its role as one of the largest buyers in government bond markets (Duguid and Megaw 2023), but also obliterates the main driver of the low Term Premia.

8 US government's fiscal deficit

In the Fiscal Year of 2023, US's federal budget deficit reached 6.3% of GDP, a 23% increase from the prior year. According to the Congressional Budget Office, which produces independent analyses of budgetary and economic issues to support the Congressional budget process [1], in the absence of profound changes in the current fiscal dynamics, United States' fiscal course will become unsustainable in a few years. In terms of figures, CBO projects that the structural mismatch between spending and revenues, along with the cost of debt [2], will take off in an accelerated upward trajectory, reaching 8.5% of GDP by 2054.



Source: *The Long-Term Budget Outlook: 2024 to 2054* (n.d.)

With an aging population, the United States faces, on one side, a scenario of increasing primary expenses on Social Security and Medicare, and on the other, a shrinking working-age population. In such a framework, the inherent challenge of maintaining fiscal accounts balanced is further compounded by rising interest costs. Concerning this, in 2023, US's Treasury Department gathered that public debt's net interest costs reached 2.5% of GDP, almost twice the amount of 2020 (*2023 Interest Costs Reach 659Billion* n.d.). Moreover, the CBO foresees that the interest payments, which accounted for about a third of the federal deficit every year in the

[1] (*Introduction to CBO* n.d.)
[2] (*ONCE AGAIN, CBO'S PROJECTIONS INDICATE THAT THE FISCAL TRAJECTORY OF THE UNITED STATES REMAINS UNSUSTAINABLE* n.d.)

past two decades before Covid-19, will climb to two-thirds of the yearly deficit in the next two decades (*America's fiscal outlook is disastrous, but forgotten* 2024).

At the core of these projections lies the hypothesis that the neutral interest rates are now higher than they have been in the past decade. This debate arises at a time when current data indicates that the effects of the ongoing monetary tightening have been milder than what would have been expected given the consensual low neutral rate environment that existed prior to the pandemic (Kashkari 2024). If the Fed Board agrees with this view, the most likely short-term implication would be the slow down of the rate-cutting process, as the monetary authority will be given more time to assess incoming economic data "with less risk that too-tight policy is going to derail the economic recovery," as posed by Minneapolis Fed President Neel Kashkari (Irwin 2024). Furthermore, for the longer-horizon, long-term rates could settle at a higher level, what would mean a permanently higher cost of debt.

If materialized, this scenario of persistent budget imbalances combined with higher interest rates could pose significant consequences to America's economy and, thus, Treasury yields. Firstly, there is the risk that the Treasury market becomes insufficient to support the size of the fiscal deficit. As US's public debt approaches $35 trillion and interest rates costs are on track to reach an annual amount of $1 trillion in 2026 (with chance of becoming structurally higher with the potential increase in the neutral-rate), investors might get less inclined to support government's plans to borrow through newly issued Treasuries (Ziady 2024). In this context, in 2023, Fitch downgraded US's Long-Term Foreign-Currency Issuer Default Rating (IDR) from 'AAA' to 'AA+', reflecting an anticipated fiscal deterioration over the next three years and a high and growing general government debt burden (*Inside the Ratings: US Sovereign Downgrade and Economic Outlook* 2023).

It should be mentioned, however, that similarly to many of the topics explored in the current work, there is little consensus on how the Treasury market will evolve. For some, Warren Buffet among them, the demand is expected to keep pace with the increase in supply. In this context, at the Berkshire Hathaway 2024 annual shareholder's meeting, the company's 93-year-old chairman shared his perspective that US debt is likely to 'remain acceptable for a very long time because there aren't many alternatives,' citing the US dollar's status as the world's leading reserve currency (Reuters 2024). Another common approach is to look for grounding in real world evidences: Japan, with a net debt of about 155% of GDP, has no trouble issuing new bonds.

Whereas it is unlikely that the United States will undergo a bond crisis similar to the one that affected the UK in 2022, no risk should be neglected. In this regard, although it is true that the dollar's status as the world's leading reserve currency plays an important part in safeguarding the US debt stability, a lesson harshly learned since the pandemic is that market reactions to monetary policy are far less predictable than they once were. As for Japan's experience, it should be noted that the Asian country has managed to face its obligations primarily due to extremely low interest rates (*America's fiscal outlook is disastrous, but forgotten* 2024), which is not the case in the US Therefore, summoning once more the Efficient Markets Theory (Fama 1991), risks that are known and that cannot be ruled out, have influence on agents' investment decisions.

In addition to the expectation of lower demand, the risk of the budget deficit further increasing if Donald Trump is reelected in November is also vivid in investors' minds. This fear is backed by America's latest republican president statement that one of his core priorities for a second term would be extending the sweeping tax cuts that congressional Republicans approved in 2017 (Luhby 2024). According to CBO, this measure would cost about $3.5trn over the next 10 years footnote(*Budgetary Outcomes Under Alternative Assumptions About Spending and Revenues — Congressional Budget Office* 2023), with a net effect (considering Mr. Trump's plans on the revenues side) of an even higher deficit.

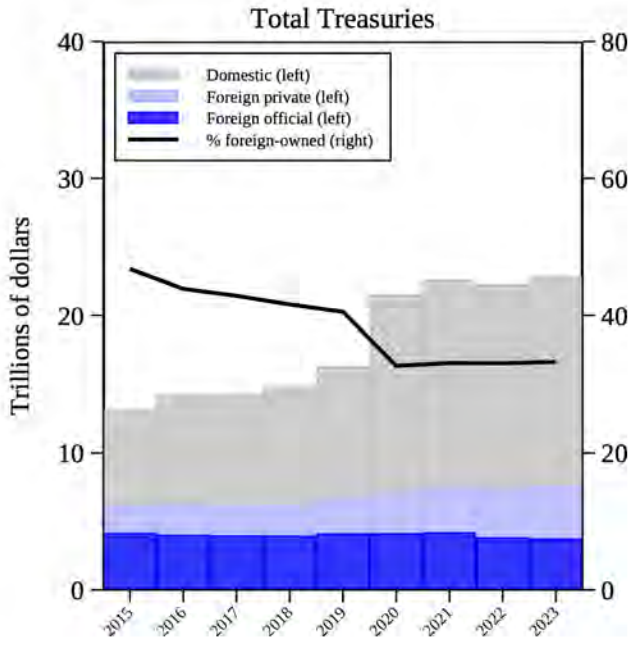
Moreover, even in the event of Biden's reelection, it is unlikely that the fiscal outlook would undergo a profound turnaround. Since any measure to improve America's public accounts is expected to slow down economic activity, causing popular opposition, it is far from clear if Biden or any other candidate would be willing to navigate through this resistance. In this regard, while the outcome of the next presidential election is still uncertain, there seem to be less disagreement on the likelihood of a fiscal reversal in the incoming government. Consequently, the overall expectation is that the US government will continue on the same path it has been on for the past few years: paying for heavy deficit spending by issuing trillions of dollars worth of bonds to investors (Dugan 2023).

In conclusion, the US fiscal deficit is a relevant driver behind the current increase in Treasury yields. On one side, the consistent lack of fiscal rectitude associated with higher costs of debt, increases the risk of holding Treasuries and translates into reduced demand and higher term-premiums required. On the other hand, the overall expectation is that US fiscal accounts won't reach a turning point in the near future and might even deteriorate. Consequently, this outlook suggests an oversupply of

Treasuries and lower prices for these securities, thereby also pressuring the term premium component of the yields.

9 Foreign Investors: the Japanese Case

Finally, another potential force behind the current higher-yield trend is the reduction in the foreign demand for Treasuries. According to the latest Treasury International Capital (TIC) System's annual report on Foreign Holdings of US Securities, foreign ownership of Treasuries reached $7.6 trillion in 2023. Although in recent years international investors have notably lost ground to domestic ones, they still remain very relevant in Treasury demand, holding about a third of the outstanding debt. In this sense, in order to better explore this topic, the following analysis will focus on Japan, the largest foreign holder of US debt.



Source: **Department of the Treasury, NY Fed**

9.1 Reduced Demand from Japanese Investors

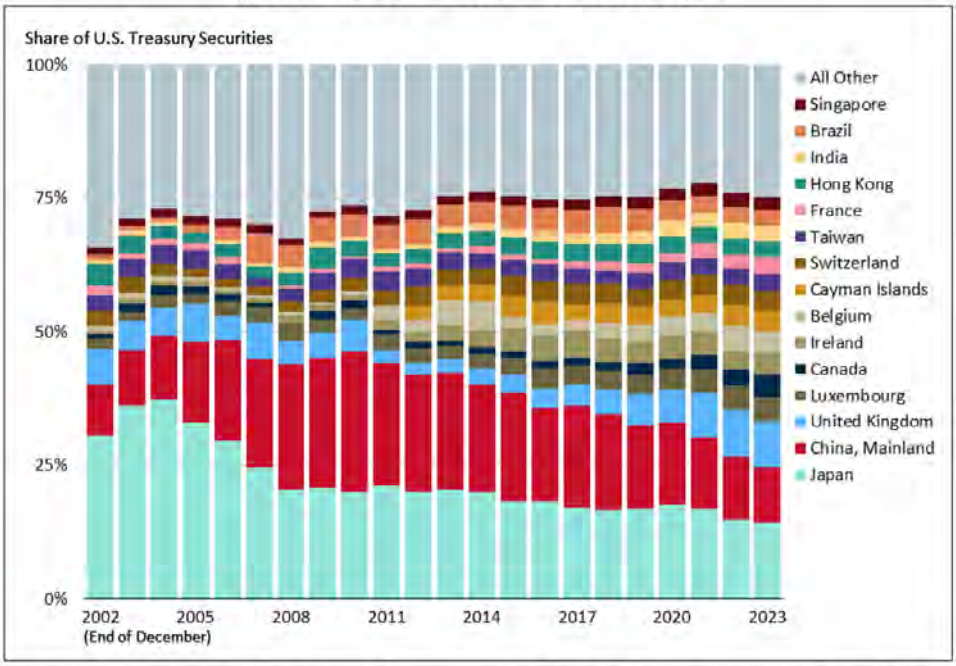
To understand Japan's role in the Treasury market, one must be aware of a distinctive feature of the Japanese economy: its long lasting history of near-zero interest rates. Dating back to the late 1990s, the low interest-rate policy was first implemented by the Bank of Japan (BoJ) in an attempt to combat secular stagnation and

persistent mild deflation. Since then, short-term real rates have remained extremely low, ranging from slightly negative to near-zero levels (Feingold 2024). In this regard, the decades of rock-bottom interest rates in Japan have led retail and institutional investors to look for opportunities abroad - notably, in Treasuries ("Japan's Demand for Foreign Bonds to Remain Weak" 2023).

In terms of figures, according to TIC [1] System Data, Japan stands out as the largest foreign holder of US Treasuries. Within this framework, in 2023, it accounted for around 14% of the total amount in foreign hands (Treasury 2023). Consequently, when the BoJ made its first movements towards easing the yield curve control policy at the end of 2022 (Fujioka 2023), markets began to anticipate a relevant impact on the Treasury market.

Figure 2. Composition of Foreign Holdings of U.S. Treasury Securities (2002-2023)

Figure is interactive in the HTML version of this report.



Source: Created by CRS. Data from U.S. Department of the Treasury, Treasury International Capital (TIC) System, at https://ticdata.treasury.gov/resource-center/data-chart-center/tic/Documents/mfhhis01.txt.

Source: *Foreign Holdings of Federal Debt* (2024)

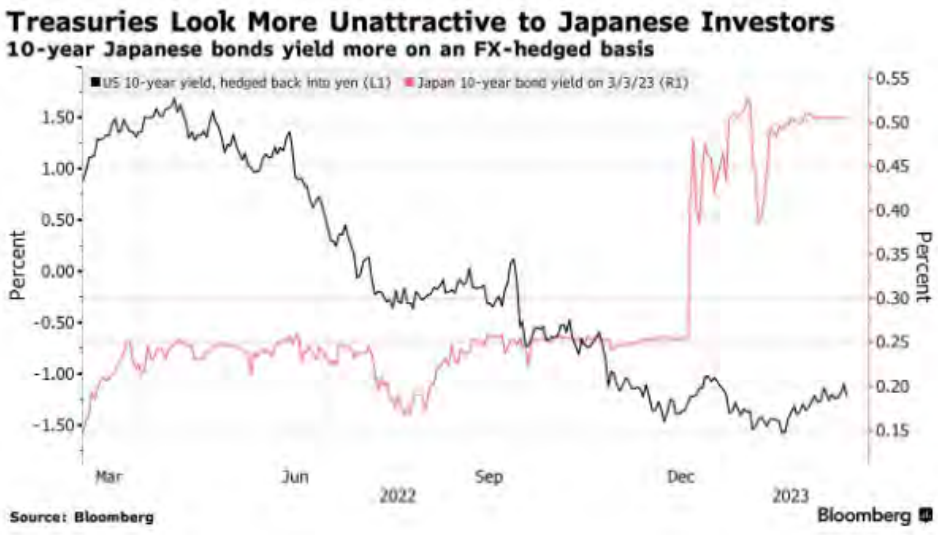
To grasp the effects of Japanese monetary policy changes on the US debt market, it is essential to understand the Yield Curve Control (YCC) policy. Introduced in 2016, this policy consists in setting interest rate targets for different maturities on the sovereign yield curve, a goal met thorough an implicit commitment to buy or

[1] Treasury International Capital

sell assets to maintain rates in line with the defined levels (Mattos 2023). In this regard, since the YCC was first implemented, the BoJ has been a major player in the Japanese Government Bonds (JGBs) market, holding about 52% of the total public Japanese debt outstanding in 2022 (*Japanese Government Bonds* 2023). As a consequence of this process 10-year interest rates stayed around to 0% ever since.

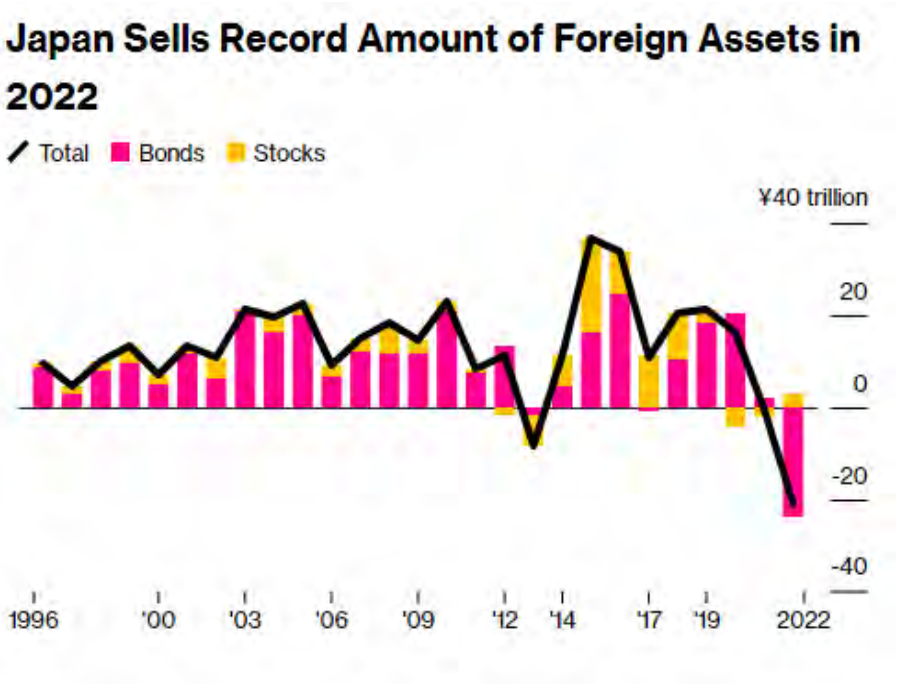
However, at the end of 2022, the outlook began to change. First, the BoJ lifted its cap on 10-year government bond yields from 0.25% to 0.5%. Then, in July 2023, it set 1% as the maximum level the 10-year sovereign rate could reach, finally converting this ceiling into a benchmark three months later. By this time, the overall perception in the markets was that the YCC policy was nearing its end (Mattos 2023). Within this framework, although Japanese bonds still offered lower yields than US Treasuries, higher hedging costs triggered by US rate hikes made the choice between Treasuries and Japanese Government Bonds (JGBs) far less clear-cut.

Typically, to mitigate the risk of adverse currency movements, investors borrow foreign currencies at fixed rates through currency-hedging strategies. As hedging costs are commonly determined by the spread between the short-term rates of the two currencies involved in the transaction, when the Fed's began hiking rates, these values increased considerably, offsetting returns on overseas investments. According to Teruki Morinaga, director of insurance at Fitch Ratings Japan, with the fast monetary tightening in the US, currency hedging costs have reached around 5%, a level so high that returns turn negative. (Poulsen 2023).



Source: **Bloomberg (Cherry 2023)**

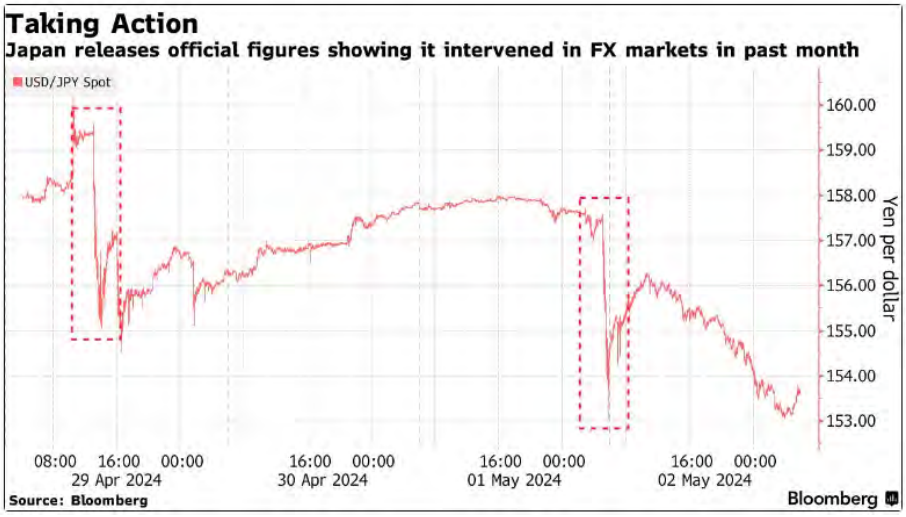
As a result of this process, not only did the Japanese demand for newly issued Treasuries pullback, but also large institutional investors liquidated all-time-high amounts of foreign government bonds from their portfolios, attracted by the favorable momentum to invest in the local market. Figures from the Japanese Ministry of Finance show that, in 2022, a net ¥15.7 trillion of US bonds were sold in this maneuver (Cherry 2023). Moreover, the total Treasury holdings in Japan fell by 18.5% year over year in November 2022 (Brennan 2023).



Source: **Bloomberg (Kondo 2023)**

9.2 BoJ's FX Intervention

Lastly, it is worth mentioning the potential impact of the yen's depreciation on Treasury yields. Since 2022, the Japanese currency has undergone recurring episodes of severe depreciation, further increasing the inflationary challenges. In response, aligned with recent changes in monetary policy, for the past two years, the Bank of Japan has been actively intervening in the FX market to support the yen. According to data from the finance ministry, between April and May 2024, Japan spent a record $62.2 billion defend the yen, surpassing the amount sold in 2022 to prop-up the currency after it fell to a 34-year low against the dollar (Yokoyama 2024).



Source: **Bloomberg (Yokoyama 2024)**

However, despite these interventions, excessive currency fluctuations remain a persistent concern for the Japanese government. Within this context, Finance Minister Shunichi Suzuki expressed his "strong concern on how a weak yen pushes up import costs", and how "these developments have laid the groundwork for Japan to take appropriate action (in the currency market)" (Kihara 2024). Similarly, the vice Finance Minister said that authorities are ready to intervene in currency markets 24 hours a day if necessary [2]. Assuming that the Japanese government holds enough credibility, it is reasonable to conclude that in response to these hawkish messages, markets would anticipate proactive measures from authorities if needed.

In FX interventions, the chosen source of funding could pose significant consequences to the Treasury markets. Interventions through the sale of US long-term bonds, for instance, can cause relevant disruption in the long end of the yield curve by increasing the supply of low-liquidity assets. On the other hand, yen purchases through dollar deposits sales typically have a minor impact on the US bond market due to the higher liquidity of these assets.

Nonetheless, despite being a preferable mean of intervention, dollar deposits are limited. In terms of numbers, estimates suggest these assets to be worth around $155 billion, a small amount when compared to the $120 billion sold to strengthen the local currency in 2021 and 2022. As a consequence, depending on the yen's future trajectory, this funding alternative may be insufficient to support continued interventions, creating a tail risk of potential FX interventions through Treasury sell-offs and increasing the required term premium (McGeever 2024). While this effect

[2] "Japan's Kanda Says Can Intervene 24 Hours a Day If Needed" (2024)

stems from uncertainties associated with Japanese policy, its implications extend globally, influencing the perceived risks of Treasuries worldwide.

10 Conclusion

Since the end of the Covid-19 Pandemic, a sharp decline in the Equity Risk Premium (ERP) has drawn considerable attention from market participants and academics. During the same period, while none of the fundamentals of equity returns appeared to have changed, Treasury yields reached 16-year highs. Within this context, the aim of this work is to unveil the sudden fall in the ERP from a Treasury perspective, through a thorough analysis of the potential factors underlying the atypical surge in yields.

Built upon an extensive review of the vast existing literature, the present research was structured in three complementary stages. Initially, by introducing the Capital Asset Pricing Model (CAPM), the relationship between the Equity Risk Premium and Treasury yields is elucidated. Then, based on the Treasury Yield Premium Model by (Christensen, Diebold, and Rudebusch 2011) & (Christensen and Rudebusch 2012), the yields are decomposed into its fundamental parts: the expected short-term interest rate, determined by the expected real rates and inflation expectations, and a term premium, which comprises all the factors that make investing in longer-maturity bonds riskier than sequentially reinvesting the principal in short-term securities. Finally, the analysis unveils post-pandemic dynamics through the economic perspective, identifying potential drivers behind the recent surge in Treasury yields, and examining their nature alongside with the channels through which they affect yields.

The central finding of this work is that the observed surge in Treasury yields has been primarily a consequence of simultaneous dynamics associated with the monetary policy responses to the pandemic, structural changes in the economic landscape and repercussions of a long lasting lack of fiscal rectitude in the United States. In this regard, Fed's quantitative tightening not only reduced US's official demand for Treasuries, but also indirectly contributed to restraint the foreign demand for these securities. Moreover, as a consequence of US persistent budget imbalances and potentially higher neutral rates, the overall expectation is that supply will further increase in the future. Naturally, combined with a retracted demand, these factors enhance the perception of risk.

Ultimately, it was clarified that the surge yields has been mainly driven by an increase in the term premium component, thereby refuting the hypothesis that yields could be higher due to de-anchored inflation expectations, and confirming the effec-

tiveness of Fed's Forward Guidance. Additionally, the findings suggests that, rather than an anomaly, the observed increase in Treasury yields through the rebound in the term premia constitutes, in fact, a reversal from an anomaly. In the past years, due to subsequent accommodative monetary policies, the term premium became artificially compressed, in such a way that the existing risks intrinsic to longer-term securities were disguised by an inflated demand from the Central Bank. In this sense, when Fed finally adopted a more restrictive approach in the aftermath of the pandemic, the perceived risks from holding these securities began to be effectively priced into the long end of the yield curve.

11 Data Sources

The research will evaluate the possible reasons underlying the sharp reduction in the risk premium between stocks and Treasuries, from the Treasury perspective. Data on yields and prices of Treasuries, as well as relevant macroeconomic data for the post-Covid scenario analysis, will be sourced from FRED Economic Data. Information and data on stocks will be obtained from Bloomberg Finance LP.

Furthermore, references to economic articles on the subject will come from websites such as Financial Times, The Economist, and The Wall Street Journal, among others.

12 Deadlines

2024/06/30 → Deliver the final version of the thesis, which will include additional drivers behind the Treasury Yield increase (namely, US government's growing budget deficit and reduced demand from other sides). This phase may also entails the development of models or other tools to arrive at a definitive conclusion.

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