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Abstract

As the debt ceiling episode unfolds, we highlight a sharp increase in trading activity and liquidity in the U.S. credit default swaps (CDS) market, as well as a spike in U.S. CDS premiums. Compared with the periods leading up to the 2011 and 2013 debt ceiling episodes, we show that elevated CDS spreads in the current environment are partially explained by the cheapening of deliverable Treasury collateral to CDS contracts. We infer the likelihood of a U.S. default from these CDS premiums, and estimate an increase in the market-implied default probability from about 0.3–0.4% in 2022, to around 4% in April 2023, which is lower than it was in July 2011 and about where it was in October 2013. Finally, we document changes in Treasury bills trading activity as market participant update their expectations for a U.S. default.

JEL Codes: G10; G12; G18; G28; E32; E43; E44

Keywords: U.S. default; U.S. CDS; default probabilities; sovereign CDS; debt ceiling

The U.S. "debt limit" is the total amount of money the U.S. government can borrow to meet its existing obligations. On January 19, 2023, the U.S. reached this debt limit and has since taken "extraordinary measures" in order to prevent the U.S. from defaulting on its obligations as Congress deliberates increasing this limit. However, market participants estimate these measures

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could be exhausted as early as June 2023. While past debt limit episodes have always resulted in Congressional actions to raise the limit, these events have implications for market pricing of a potential default of the U.S. on its debt.[2] Credit default swap (CDS) premiums referencing U.S. government debt have significantly increased during 2023. In this article we use U.S. CDS data to examine the market-implied default probability of a U.S. default event. We refer to such measure as a "risk-adjusted" probability, because it incorporates an adjustment due to market participants' attitude toward default risk, the uncertainty surrounding the loss given a default and, more broadly, the scale of a default. Moreover, we compare the current estimates to those computed for the two previous major debt ceiling episodes of 2011 and 2013.

The market of U.S. credit default swaps: A brief history and recent developments

A credit default swap is a financial contract that allows two parties to trade credit risk, meaning the risk that a borrower, called the reference entity, will default on its bonds or loans. One of the parties, known as the "protection buyer," pays a premium to the other, called the "protection seller." In exchange for the premium payments, if the borrower reference entity defaults on its bonds or loans, then the protection seller is required to make a payment to the protection buyer for the decrease in market value of the borrower's bonds and loans (e.g., Cocco 2002).

The CDS market has grown since its inception in the 1990s. Figure 1 shows that growth increased significantly in the years prior to the Great Financial Crisis, with the total notional amount outstanding peaking above $67 trillion at the end of 2007 (see also Aldasoro and Ehlers 2018). The market shrank dramatically in the aftermath of the Great Financial Crisis in 2008, dropping to $7.8 trillion by mid-2019.[3] More recently, growth has been picking up again, and notional outstanding has increased to $9.3 trillion by June 2022.[4] Prior to the Great Financial Crisis the CDS market traded over-the-counter, i.e., trading occurred between two parties away from an exchange, with terms conforming to the standards set by the International Swaps and Derivatives Association (ISDA). As a result of the global reforms introduced after the Great

[2] See Debt Limit | U.S. Department of the Treasury
[3] See Table D10.1 by the Bank of International Settlements (BIS) with OTC, credit default swaps, by type of position as of June 2019. See also ISDA's Swaps Info Full Year 2022 and the Fourth Quarter of 2022 Review.
[4] See Tables D10.1 of the BIS report on OTC Derivatives Outstanding, June 2022.

Financial Crisis, the majority of CDS are traded on Swap Execution Facilities (SEFs) and cleared at central counterparties (CCPs) regulated by the Commodity Futures Trading Commission (CFTC) for swaps[5] or the U.S. Securities and Exchange Commission (SEC) for security based swaps.[6] As of 2022, CDS traded on SEFs represented 82.6% of total CDS notional and 87.1% of total trade count; and CDS cleared on CCPs represented 83.7% of total credit derivatives traded notional and 88% of total trade count.[7]

Contracts on sovereign reference entities comprise a fairly small portion of the CDS universe, with a notional outstanding amount of $1.2 trillion in June 2022, or around 13% of the total market size.[8] Within the sovereign CDS asset class, trading is typically concentrated in contracts that reference debt obligations of emerging market economies, e.g., Argentina, Brazil, Mexico, Russia, and Turkey (e.g., Bomfim 2022). There have been exceptions, however. For instance, the Euro zone crisis of 2009-2010 triggered interest in trading CDS referencing advanced European economies, in particular CDS referencing the sovereign debt of Italy or Greece.

In contrast to the broader corporate and sovereign CDS markets, the U.S. CDS market is relatively new and, in comparison, much smaller. Boyarchenko and Shachar (2020) document that the gross notional value of total outstanding CDS positions on U.S. sovereign debt peaked at $32.3 billion in August 2011, around the time when Congress passed the Budget Control Act that resolved the debt ceiling episode of 2011. After that, trading activity has declined significantly, with pockets of growth around the debt ceiling episode of 2013. Total gross notional reached its lowest level of $1.3 billion outstanding by 4Q 2021 – decreasing from around $26 billion in 4Q 2013. Nonetheless, while U.S. CDS markets may see very low activity for long periods of time, they have exhibited sharp swings of relatively elevated activity around debt ceiling episodes.

The on-going 2023 debt ceiling episode brought renewed attention to the CDS market on U.S. sovereign debt. Figure 2 shows that the gross notional outstanding of CDS contracts referencing

[5] For the definition of swap, see the Wex Legal Dictionary at the LII Legal Information Institute (2023). Index swaps referencing more than 9 reference entities are regulated by the CFTC; see, e.g., CFTC (2012).
[6] Security based swaps are single name swaps referencing one reference entity, or narrow-index swaps, meaning swaps referencing 9 or less reference entities. For single name swaps, see the Wex Legal Dictionary at the LII Legal Information Institute (2023) available here, and for narrow-based security index swaps, see here.
[7] See Graph A.6 of the BIS report on OTC derivatives statistics at end-June 2022 and ISDA (2023).
[8] See D.10.4 of the BIS report on OTC Derivatives Outstanding, June 2022.

U.S. government debt started to increase in January 2023, reaching a $12 billion peak the week of April 14, 2023. While the gross amount outstanding remains below the levels registered in 2011 and 2013, the *net* notional amount increased to $5.2 billion the same week of April 14, higher than the $4.1 billion level reached in the week of October 25, 2013. Gross notional activity may at times overstate the economic exposure of the seller of protection to a default by the reference entity; in contrast, the net positions give a better estimate of the ultimate exposure, as they represent the aggregate payments to be made by the protection seller in the event of a default by the reference entity (e.g., IOSCO 2012).

In addition to increases in notional amounts outstanding, broader trading activity increased significantly as well, as seen in Figure 3. Gross weekly trading amounts peaked at $3 billion the week of February 3, 2023, corresponding to 103 traded contracts, and declined in subsequent weeks. Such an increase in trading activity is also evident in Table 1, which shows the top single-name CDS contracts by average notional (left panel) and trades per day (right panel) for 2023Q1 and 2022Q4. The U.S. CDS ranked 12th in average notional out of around 500 single-name entities tracked by DTCC. While it ranks lower on the average trades per day (11), it is still within the top 50 in that category as well. Thus, while U.S. sovereign CDS trading activity remains very small compared to other markets, such as the U.S. Treasury market, the recent increases in trading activity for U.S. CDS has been significant compared to other single-name CDS activity.

Concurrently, CDS premiums increased rapidly too (Figure 4), reaching 177 basis points on May 1, 2023 for the contract with 1-year tenor, a level that is 2-3 times higher than that recorded during the two previous major debt ceiling episodes of 2011 and 2013.[9] In addition, the recent increases in CDS premiums pushed 1-year CDS spreads above the 5-year tenor; normally, the quoted spread on the 5-year CDS is higher than the 1-year CDS due to generally greater uncertainty further into the future in terms of the probability of a credit event. The relative

[9] The press and financial analysts have increased interest in the evolution of U.S. CDS premiums and the increased activity in U.S. CDS market, see, e.g., Robin Wigglesworth in the March 8 Financial Times and research by Barclays, Credit and Rates Strategy (2023). Both of these pieces discuss the effect of these market developments on the implied probability of a U.S. default.

increase in 1-year CDS reflects investor interest to seek protection for a possible credit event in the short term, such as one related to the debt ceiling episode.

These developments prompt the question, what does the recent run up in U.S. CDS premiums and volumes tell us about the underlying probability of a U.S. default from these market prices? Moreover, is such a probability any different from that implied by U.S. CDS premiums observed before the debt ceiling episodes of 2011 and 2013?

To answer these questions it is useful to clarify the cash flows generated by a CDS contract, and how such expected payments map into a CDS premium, given market participants' assessment of the likelihood of a default. To this end, in the next section we briefly discuss how CDS contracts are settled.

Settlement and cash flows

In a CDS, following a default by the reference entity the protection buyer extracts value from the contract through physical or cash settlement. In the case of cash settlement, the protection buyer receives from the protection seller the cash value of the difference between the face value and the market value of an obligation of the reference entity. In the case of physical settlement, the protection buyer delivers to the protection seller an obligation of the reference entity that satisfies certain pre-agreed criteria (e.g., the reference obligation must be freely transferable, must have a maximum maturity of no more than 30 years),[10] and the protection seller pays to the protection buyer 100% of the face value of the obligation. The protection buyer extracts value from this transaction because at the time of the default the obligation will be worth less than 100% of its face value. If at the time of the default the reference entity has multiple bonds outstanding, then the protection buyer delivers to the protection seller the cheapest of the assets eligible for delivery, so as to maximize their cash flow upon default.

As the market evolved, participants started to use CDS contracts to trade based on their views on the riskiness of a specific company. The derivative nature of the CDS market made it possible to express a view on the likelihood of default of a reference entity without having to physically buy

[10] See, e.g., ISDA (2011).

or sell its bonds, which may be illiquid and sometimes in limited supply. Consequently, the outstanding amount of CDS notional on a given entity at times exceeded that of the bonds outstanding by that entity, rendering physical settlement impractical. Eventually, settlement took the form of an auction mechanism that gives investors the option to cash or physically settle.[11] The auction is designed to arrive at a market-wide settlement valuation of the current market value of the debt of the reference entity, while preventing manipulation of the auction results. In the auction, all market participants can deliver and purchase bonds of the defaulted entity. That means that if the size of the auction exceeds the amount of cheapest-to-deliver bonds that are deliverable, then those delivering into the auction will have to find the next cheapest to deliver, and so on. Hence, the price at which the auction settles is more of a blend of the deliverable obligations issued by the reference entity.

If Congress does not lift the debt ceiling going forward, the U.S. would likely be unable to make timely payments on its debt obligations.[12] The Credit Derivatives Determination Committee (DC)[13] would then be tasked to rule whether a credit event occurred, i.e., if payments should be made on CDS contracts. Moreover, the DC determines whether to hold an auction and what securities are deliverable into that auction. The outcome of such an auction would be affected by the *valuation* and *availability* of the cheapest deliverable bond.

The cheapest to deliver bond typically changes on a day-to-day basis. During the on-going debt ceiling episode, however, the cheapest deliverable into a hypothetical U.S. CDS auction has consistently been the thirty-year Treasury bond that matures on May 15, 2050.[14] This bond was issued at a price close to par on May 15, 2020, at the peak of the Covid crisis, with a coupon rate of only 1.25%. Since then, the Federal Open Market Committee (FOMC) has repeatedly increased the federal funds rate, resulting in a marked increase in long-term Treasury yields and a corresponding decline in the prices of notes and bonds, especially those with long maturity that

[11] Markit and Creditex provide a primer on the CDS settlement mechanism, available here. Chernov, Gorbenko, and Makarov (2013) study the implications of the two-step auction mechanism that allows for cash and physical settlement. See also Williams et al. (2011).
[12] Other countries have experienced sovereign debt crises that have ended in other forms of default. Examples include debt repudiation or a moratorium on debt payments (e.g., Russia 1998), and debt restructuring (e.g., Greece 2012).
[13] In 2018, ISDA appointed DC Administration Services, Inc. (DCAS) as the Determination Committees Secretary. The most recent website for the Determination Committees is here.
[14] Based solely on pricing and not taking into consideration the availability or scarcity of this security.

make low coupon payments. This is evident in the price history shown in Figure 5: The price of the bond maturing in 2050 reached its lowest level of $49.4 on October 21, 2022, and subsequently partially recovered to $57.25 on May 5.

The net notional outstanding in U.S. CDS contracts is small relative to that of Treasury bonds. For instance, there is more than $73 billion Treasury bonds maturing on May 15, 2050. Although a fraction of these bonds are tied up in buy-and-hold portfolios of long-term investors, the sheer size of the issue dwarfs the $5.2 billion of net notional in U.S. CDSs outstanding as of the week of April 14.[15] Hence, it is reasonable to assume that, in case of a default, the CDS auction will clear at a price close to that of the cheapest-to-deliver bond.

In sum, the cash flows for a U.S. CDS contract are as follows. A protection buyer will be paying the CDS premium from the inception of the contract through either maturity or the sovereign "default," whichever comes first. In case of a credit event, the cash flow perceived by the protection buyer would approximately be the difference between $1 and the price of the cheapest deliverable per unit of face value, times the notional amount of the CDS contract. The exact amount of that cash flow is unknown today, e.g., U.S. Treasury yields could increase in the summer if market participants anticipate that a breakdown of the negotiations on the debt ceiling is imminent. However, the price of the cheapest deliverable Treasury bond today is, in present value, a reasonable estimate of the expected cash flow based on current information.

In the next section we tie CDS premiums and their expected cash flow together with market participants' assessment of the probability of a credit event.[16]

What do U.S. CDS premiums tell us about the likelihood of a default?

[15] In fact, there is an additional $89 billion outstanding in the 30-year Treasury bond maturing on August 15, 2050. That bond has a coupon rate of 1.375% and trades at a price only slightly higher than that of the cheapest deliverable.

[16] Chernov, Schmid, and Schneider (2020) develop an equilibrium macro-finance model to examine whether U.S. CDS premiums reflect the probability of a fiscal default—a state in which a balanced budget can no longer be restored by raising taxes or eroding the real value of debt by increasing inflation. They conclude that their calibrated model is consistent with elevated levels of CDS premiums but leaves dynamic implications quantitatively unresolved.

At the inception of the CDS contract, the buyer and the seller of credit derivative protection agree to a CDS premium such that the contract has zero market value. That is, the present value of CDS premium payments made by the protection buyer equals the present value of the payments made by the protection seller.

In a single period model, and abstracting from transaction costs, this implies:

$$\begin{aligned}&\text{PV CDS premiums}\\&= p * \text{PV Cashflow(credit event)} + (1-p) * \text{PV Cashflow(no credit event)},\end{aligned}$$

where p denotes the risk-adjusted probability of a credit event and PV denotes the present value of a cash flow. In case of no credit event, the seller of CDS insurance makes no payment, hence the Cashflow(no credit event) term is zero. Thus, the CDS pricing equation simplifies into an expression for the risk-adjusted default probability,

$$p = \frac{\text{PV CDS premium}}{\text{PV Cashflow(credit event)}}.$$

While the simple single-period example is useful to convey intuition, in practice CDS contracts involve pro-rated quarterly payments of the premium, and the default could occur at any time during the tenor of the contract. We explain our computations in more detail in the Appendix.

Figure 6 shows our estimate of p during the on-going debt ceiling episode. In 2022, the risk-adjusted default probability was fluctuating in a 30-40 bps range. However, beginning from January 2023, p has spiked up to about 1.8%, and later continued to increase to about 4% through the end of April.[17] The increase from the previous year is significant; it coincides with the heightened trading activity in U.S. CDS contracts (Figures 2-3) and, of course, the spike in premium (Figure 4).

For comparison, we repeat a similar exercise for the periods leading up to the 2011 and 2013 debt ceiling episodes. To that end, we collect data on all Treasury securities issues that were outstanding at the time, and for each day we identify a hypothetical Treasury security that would

[17] The first jumps took place on January 11-17; over those days it had become know that the U.S. was going to reach its debt limit by January 19. For instance, on January 13 U.S. Secretary of the Treasury Janet Yellen sent a letter to all members of Congressional leadership regarding the debt limit (available here). The financial press quickly reacted to such news, see, e.g., Thomson Reuters on January 17 (available here).

have been cheapest to deliver in case of a default. Unlike the current episode where the cheapest to deliver security has remained constant, such a security in 2011 and 2013 changed over time, rendering the default probability estimate noisier. To attenuate this problem, we use the average price of the cheapest deliverable bonds over the previous five calendar days. We then infer default probabilities from U.S. CDS prices, shown in Figure 7. In the summer of 2011, *p* hovered around 4% before reaching a 6% peak shortly before the passing of the Budget Control Act of 2011, which brought the first of the two episodes to conclusion on August 2. In the second episode, *p* peaked at 4% in fall of 2013, shortly before the October 17, 2013 passing of the Continuing Appropriations Act, 2014, which put an end to the second episode.

The *p* estimates computed for 2011 peak at a level higher than the current episode using data through May 5, 2023. In 2013, they were at a level similar to what we observe now. Yet, 2023 CDS premiums have reached a level that is more than twice than that observed in 2011 and 2013 (Figure 4). This is because the CDS expected cash flow in case of a default is higher now than it was back then, due to the significant discount at which long-term Treasuries are currently trading. Hence, while investors are paying more for CDS protection now than in 2011 and 2013, currently the implied default risk is lower than it was back then.

The Debt Ceiling and the Market of U.S. Treasury Bills

In this section, we highlight additional analysis of the current debt ceiling episode by looking at other securities that are more widely-traded than U.S. CDS contracts. Of particular interest are Treasury bills expiring in the summer of 2023, when the Treasury's extraordinary measures could be exhausted. The risk of delayed payments on such securities could induce some market participants to avoid holding these securities in their portfolios in a debt ceiling episode. Such a shift in demand could push the prices of these Treasury bills down relative to those expiring at nearby maturities.

The top panel of Figure 8 shows that, as of April 28, 2023, U.S. Treasury bill yields increase into the summer, with a peak in August 2023. While yields may reflect a range of drivers, including expectations for future monetary policy by the Federal Open Market Committee (FOMC), communication from the Treasury Department related to the debt ceiling may also affect near-

term yields.[18] Figure 8 also shows the term structure of Overnight Indexed Swap (OIS) rates, which are less sensitive to the risk of a U.S. default. OIS rates are generally higher than Treasury bills yields in near-dated tenors maturing in late-spring 2023, and for tenors maturing in the fall, but the spread shrinks to nearly zero for securities maturing in August.

Pricing in these metrics shifted significantly on May 2, shortly after Treasury Secretary Yellen wrote to Congress that its estimates that the U.S. government may be unable to continue to satisfy all of the government's obligations potentially as early as June 1, if Congress does not raise or suspend the debt limit before that time. The bottom panel of Figure 8 shows that the yields on Treasury bills maturing in June have become higher than the OIS rate.

Conclusion

As the current debt ceiling episode unfolds, we infer the likelihood of a U.S. default through the lens of the sovereign credit default swaps (CDS) market. Beginning from January 2023, we document a significant increase in U.S. CDS trading, accompanied by a spike in premiums. Accordingly, we estimate an increase in the risk-adjusted default probability from about 0.3–0.4% in 2022, to approximately 4% in April 2023. Such an estimate is similar to what we find in the weeks leading up to the resolution of the 2013 debt ceiling episode, and is lower than the 6% estimate that we find in the fall of 2011.

One important implication from this analysis is that a simple comparison of historical CDS spreads to gauge market expectations around the likelihood of a credit event could be complicated by the value of the cheapest deliverable bond. Currently, the cheapest to deliver bond is deeply discounted when compared to prior debt ceiling episodes, which has contributed to wider U.S. CDS spreads.

Of course, our results are subject to caveats and clarifications. For instance, the probability p accounts for the adjustment that market participants make due to the uncertainty of a default and

[18] See the Debt Limit Letter to Congress Members 20230515 McCarthy (treasury.gov)

the actual loss-given-default, and their aversion to the risk surrounding these events. Such an adjustment could be sizeable. First, the returns on a fixed income investment are typically negatively skewed with upside limited by the face value of the bond. Second, in the event of a credit event, other assets would also likely fare poorly. Hence, there is risk in a short CDS position that is difficult to diversify away, and protection sellers will adjust the default probability upwards, thereby increasing the CDS premium. That is, the *actual* default probability is likely smaller than the risk-adjusted measure p that appears in the CDS pricing equation.

Additionally, a majority of U.S. sovereign CDS contracts are denominated in euros. Hence, their premiums could partially reflect expectations for a devaluation of the dollar in the event of a U.S. default, as observed in other sovereign CDS that trade in foreign currencies (see, e.g., Augustin, Chernov, and Dongho, 2020, Brigo, Pede, and Petrelli, 2019, Chernov, Schmid, and Schneider, 2020). An assumption implicit in our comparison of risk-adjusted default probabilities over time is that market expectations for the move in the exchange rate given a U.S. default has not changed materially across debt ceiling episodes.

Our analysis relies on U.S. CDS premiums as a gauge of default risk. While trading activity has recently increased, the U.S. CDS market remains very small compared with the size of the market for U.S. debt. Hence, the implied default probabilities likely reflect the activity of a fairly small group of specialized investors, rather than a wider consensus across the broader public. In this respect, as discussed in the previous section, the term structure of Treasury bills that mature in the summer of 2023 provides a wealth of information concerning the current debt ceiling episode that complements what we learn from the U.S. CDS market. Finally, our risk-adjusted default probability estimates pertain to a scenario in which, upon a default event, the financial system is still functioning and the sellers of credit protection are able to fulfill their contractual obligations.

We are also left with open questions. For instance, this research does not delve into who the actual holders of U.S. CDS are, or what their motivations for trading these contracts are, e.g., if they are hedging their own exposures to default risk or trading for other reasons. Learning more about the players in this market would also help us better understand the motivations and drivers during periods of increased activity in a market that is usually very illiquid.

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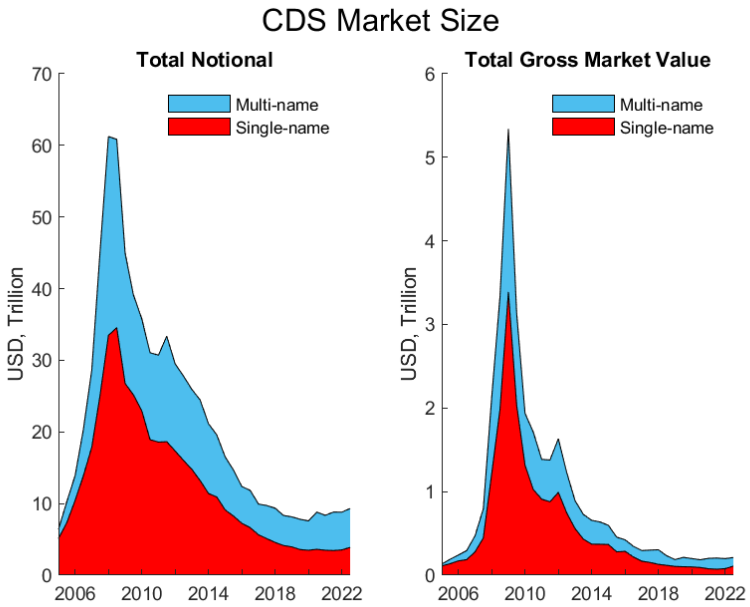

Figure 1: Total Notional and Market Value Outstanding Across the Entire CDS Market. The chart shows the total gross notional amount outstanding (left panel) and the associated market value (right panel) across the entire CDS market. Source: BIS.

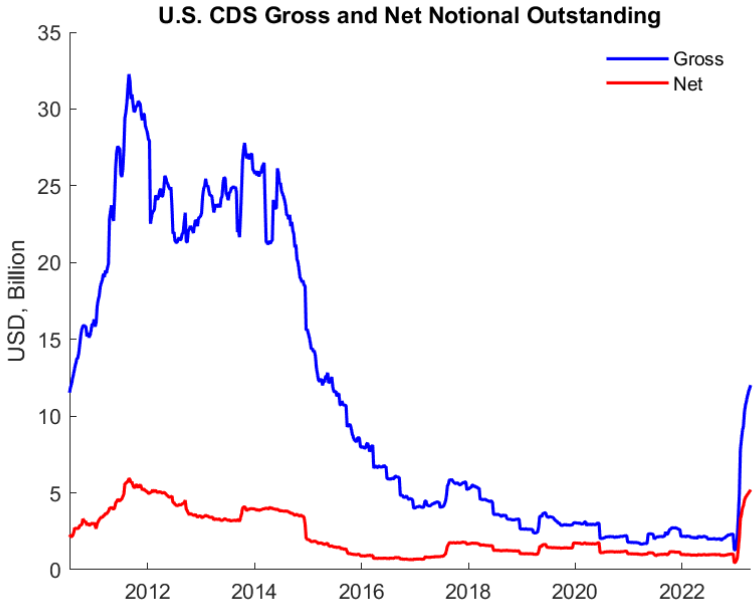

Figure 2: Gross and Net Notional Outstanding in U.S. CDSs. The chart shows the gross and net notional outstanding amounts in U.S. CDS contracts. Source: DTCC Kinetics.

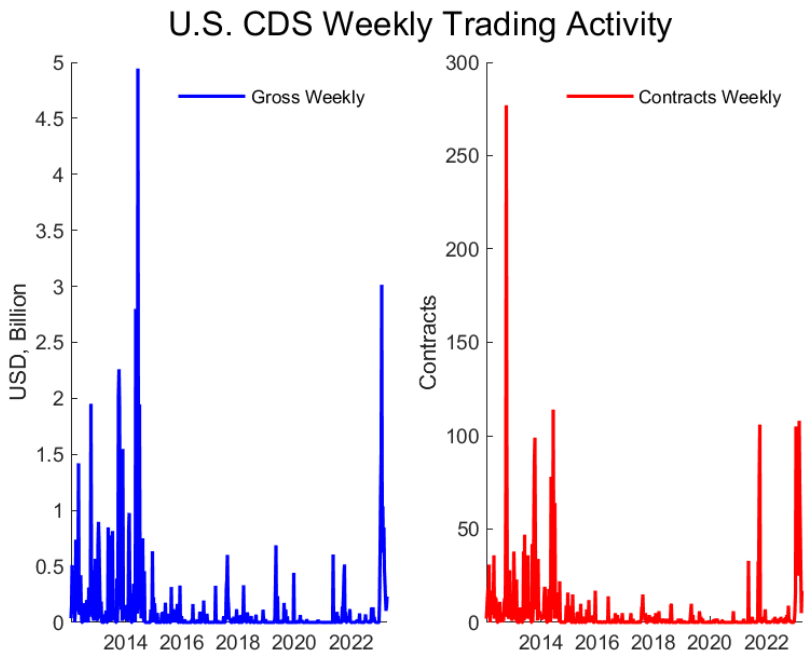

Figure 3: Weekly Trading Activity in U.S. CDSs. The chart shows weekly gross trading activity (left) and number of traded U.S. CDS contracts (right) from January 20, 2012. Source: DTCC Kinetics.

	Top 50 Average Daily Notional				*Top 50 Average Daily Trades per Day*			
	1Q 2023		4Q2022		1Q 2023		4Q2022	
1	REPUBLIC OF SOUTH AFRICA	500,000,000	FEDERATIVE REPUBLIC OF BRAZIL	350,000,000	REPUBLIC OF TURKEY	65	FEDERATIVE REPUBLIC OF BRAZIL	50
2	FEDERATIVE REPUBLIC OF BRAZIL	475,000,000	PEOPLE'S REPUBLIC OF CHINA	325,000,000	UNITED MEXICAN STATES	63	REPUBLIC OF SOUTH AFRICA	45
3	PEOPLE'S REPUBLIC OF CHINA	475,000,000	REPUBLIC OF SOUTH AFRICA	275,000,000	FEDERATIVE REPUBLIC OF BRAZIL	57	UNITED MEXICAN STATES	42
4	REPUBLIC OF TURKEY	450,000,000	UNITED MEXICAN STATES	250,000,000	REPUBLIC OF SOUTH AFRICA	56	REPUBLIC OF COLOMBIA	37
5	UNITED MEXICAN STATES	450,000,000	REPUBLIC OF INDONESIA	225,000,000	REPUBLIC OF INDONESIA	44	REPUBLIC OF INDONESIA	32
6	REPUBLIC OF INDONESIA	350,000,000	REPUBLIC OF KOREA	225,000,000	CREDIT SUISSE GROUP AG	40	PEOPLE'S REPUBLIC OF CHINA	30
7	REPUBLIC OF CHILE	325,000,000	REPUBLIC OF TURKEY	200,000,000	REPUBLIC OF COLOMBIA	39	REPUBLIC OF TURKEY	30
8	REPUBLIC OF KOREA	275,000,000	REPUBLIC OF COLOMBIA	175,000,000	REPUBLIC OF PERU	39	CREDIT SUISSE GROUP AG	23
9	REPUBLIC OF ITALY	275,000,000	REPUBLIC OF CHILE	150,000,000	REPUBLIC OF CHILE	31	REPUBLIC OF CHILE	21
10	REPUBLIC OF COLOMBIA	250,000,000	CREDIT SUISSE GROUP AG	100,000,000	PEOPLE'S REPUBLIC OF CHINA	27	REPUBLIC OF PERU	19
11	KINGDOM OF SAUDI ARABIA	225,000,000	MALAYSIA	100,000,000	REPUBLIC OF THE PHILIPPINES	27	REPUBLIC OF KOREA	15
12	UNITED STATES OF AMERICA	200,000,000	KINGDOM OF SAUDI ARABIA	100,000,000	MALAYSIA	22	CARNIVAL CORPORATION	15
13	CREDIT SUISSE GROUP AG	175,000,000	REPUBLIC OF ITALY	100,000,000	REPUBLIC OF KOREA	21	JAGUAR LAND ROVER AUTOMOTIVE PLC	15
14	REPUBLIC OF PERU	175,000,000	REPUBLIC OF PERU	75,000,000	CASINO GUICHARD-PERRACHON	18	REPUBLIC OF THE PHILIPPINES	14
15	REPUBLIC OF THE PHILIPPINES	150,000,000	REPUBLIC OF THE PHILIPPINES	75,000,000	DEUTSCHE BANK AKTIENGESELLSCHAFT	17	MALAYSIA	13
16	MALAYSIA	150,000,000	VERIZON COMMUNICATIONS INC.	75,000,000	STELLANTIS N.V.	17	FORD MOTOR COMPANY	12
17	BP P.L.C.	150,000,000	AT&T INC.	75,000,000	AMERICAN AIRLINES GROUP INC.	16	UNITED STATES STEEL CORPORATION	12
18	DEUTSCHE BANK AKTIENGESELLSCHAFT	125,000,000	VOLKSWAGEN AKTIENGESELLSCHAFT	75,000,000	JAGUAR LAND ROVER AUTOMOTIVE PLC	16	VERIZON COMMUNICATIONS INC.	11
19	TELECOM ITALIA SPA	125,000,000	BANK OF AMERICA CORPORATION	75,000,000	ALLY FINANCIAL INC.	16	AMERICAN AIRLINES GROUP INC.	11
20	TELEFONICA, S.A.	125,000,000	JPMORGAN CHASE & CO.	75,000,000	ARAB REPUBLIC OF EGYPT	16	ROLLS-ROYCE PLC	11
21	BRITISH TELECOMMUNICATIONS PUBLIC	125,000,000	UNITED KINGDOM OF GREAT BRITAIN AND	75,000,000	TELECOM ITALIA SPA	15	CASINO GUICHARD-PERRACHON	11
22	ELECTRICITE DE FRANCE	125,000,000	CARNIVAL CORPORATION	50,000,000	TELEFONICA, S.A.	15	AT&T INC.	10
23	GLENCORE INTERNATIONAL AG	100,000,000	JAGUAR LAND ROVER AUTOMOTIVE PLC	50,000,000	GLENCORE INTERNATIONAL AG	15	FORD MOTOR CREDIT COMPANY LLC	10
24	ANGLO AMERICAN PLC	100,000,000	FORD MOTOR COMPANY	50,000,000	ANGLO AMERICAN PLC	14	THE GAP, INC.	10
25	ARCELORMITTAL	100,000,000	UNITED STATES STEEL CORPORATION	50,000,000	ARCELORMITTAL	14	BEAZER HOMES USA, INC.	10
26	UNICREDIT, SOCIETA PER AZIONI	100,000,000	AMERICAN AIRLINES GROUP INC.	50,000,000	UNICREDIT, SOCIETA PER AZIONI	14	ADLER REAL ESTATE AKTIENGESELLSCHAFT	10
27	ENEL S.P.A.	100,000,000	ROLLS-ROYCE PLC	50,000,000	FORD MOTOR COMPANY	14	KINGDOM OF SAUDI ARABIA	9
28	INTESA SANPAOLO SPA	100,000,000	FORD MOTOR CREDIT COMPANY LLC	50,000,000	GENERAL MOTORS COMPANY	14	VOLKSWAGEN AKTIENGESELLSCHAFT	9
29	SOCIETE GENERALE	100,000,000	THE GAP, INC.	50,000,000	HSBC HOLDINGS PLC	14	BP P.L.C.	9
30	TESCO PLC	100,000,000	BP P.L.C.	50,000,000	ROYAL CARIBBEAN CRUISES LTD.	14	DEUTSCHE BANK AKTIENGESELLSCHAFT	9
31	MEDIOBANCA BANCA DI CREDITO	100,000,000	DEUTSCHE BANK AKTIENGESELLSCHAFT	50,000,000	THYSSENKRUPP AG	14	ENEL S.P.A.	9
32	VOLKSWAGEN AKTIENGESELLSCHAFT	100,000,000	ENEL S.P.A.	50,000,000	REPUBLIC OF ITALY	13	GENERAL MOTORS COMPANY	9
33	AT&T INC.	100,000,000	GENERAL MOTORS COMPANY	50,000,000	KINGDOM OF SAUDI ARABIA	13	ROYAL CARIBBEAN CRUISES LTD.	9
34	BASF SE	100,000,000	ROYAL CARIBBEAN CRUISES LTD.	50,000,000	BP P.L.C.	13	STELLANTIS N.V.	9
35	VERIZON COMMUNICATIONS INC.	100,000,000	STELLANTIS N.V.	50,000,000	ALTICE FRANCE	13	TELECOM ITALIA SPA	9
36	BANK OF AMERICA CORPORATION	100,000,000	TELECOM ITALIA SPA	50,000,000	LANXESS AKTIENGESELLSCHAFT	13	UNICREDIT, SOCIETA PER AZIONI	9
37	SHELL PLC	100,000,000	UNICREDIT, SOCIETA PER AZIONI	50,000,000	NEXT PLC	13	LUMEN TECHNOLOGIES, INC.	9
38	VODAFONE GROUP PUBLIC LIMITED	100,000,000	AIRBUS SE	50,000,000	CARNIVAL CORPORATION	13	AIRBUS SE	8
39	TOTALENERGIES SE	100,000,000	BARCLAYS PLC	50,000,000	BRITISH TELECOMMUNICATIONS PUBLIC LIMITED	12	BARCLAYS PLC	8
40	FRENCH REPUBLIC	100,000,000	HSBC HOLDINGS PLC	50,000,000	ELECTRICITE DE FRANCE	12	HSBC HOLDINGS PLC	8
41	CASINO GUICHARD-PERRACHON	75,000,000	INTESA SANPAOLO SPA	50,000,000	ENEL S.P.A.	12	INTESA SANPAOLO SPA	8
42	STELLANTIS N.V.	75,000,000	STANDARD CHARTERED PLC	50,000,000	INTESA SANPAOLO SPA	12	STANDARD CHARTERED PLC	8
43	AMERICAN AIRLINES GROUP INC.	75,000,000	THE BOEING COMPANY	50,000,000	SOCIETE GENERALE	12	THE BOEING COMPANY	8
44	JAGUAR LAND ROVER AUTOMOTIVE PLC	75,000,000	UNIBAIL-RODAMCO-WESTFIELD SE	50,000,000	TESCO PLC	12	UNIBAIL-RODAMCO-WESTFIELD SE	8
45	FORD MOTOR COMPANY	75,000,000	ANGLO AMERICAN PLC	50,000,000	BARCLAYS PLC	12	ARAB REPUBLIC OF EGYPT	8
46	GENERAL MOTORS COMPANY	75,000,000	BAYERISCHE MOTOREN WERKE	50,000,000	MARKS AND SPENCER P.L.C.	12	DEUTSCHE LUFTHANSA	8
47	HSBC HOLDINGS PLC	75,000,000	BNP PARIBAS	50,000,000	UNITED STATES OF AMERICA	11	THE GOODYEAR TIRE & RUBBER COMPANY	8
48	ROYAL CARIBBEAN CRUISES LTD.	75,000,000	BRITISH TELECOMMUNICATIONS PUBLIC	50,000,000	MEDIOBANCA BANCA DI CREDITO FINANZIARIO	11	TOLL BROTHERS, INC.	8
49	THYSSENKRUPP AG	75,000,000	LLOYDS BANKING GROUP PLC	50,000,000	VOLKSWAGEN AKTIENGESELLSCHAFT	11	ALLY FINANCIAL INC.	8
50	ALTICE FRANCE	75,000,000	MERCEDES-BENZ GROUP AG	50,000,000	ROLLS-ROYCE PLC	11	KB HOME	8

Table 1: Trading Activity in U.S. CDSs: 2023Q1 vs. 2022Q4. The table shows top 50 single-name CDS contracts by average daily notional U.S. dollar equivalents (left panel) and average number of trades per day (right panel). Source: DTCC Kinetics.

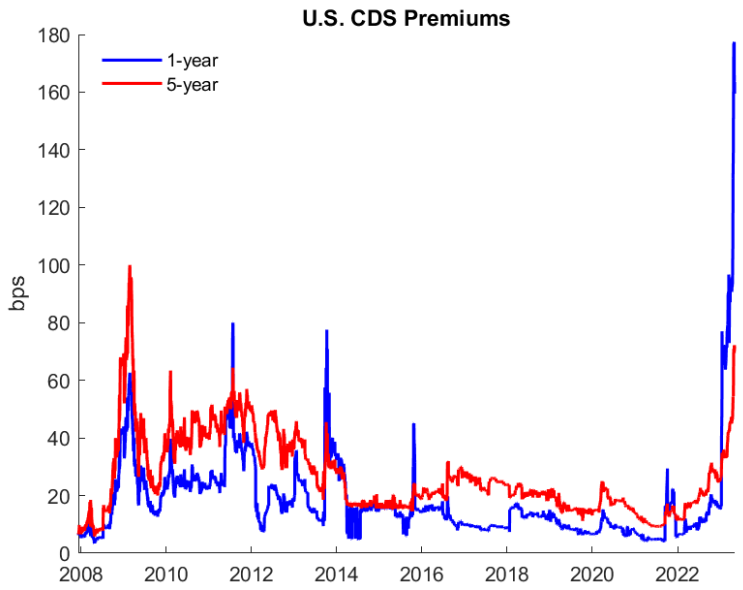

Figure 4: U.S. CDS Premiums. The chart shows the one- and five-year U.S. CDS premiums. Source: Bloomberg.

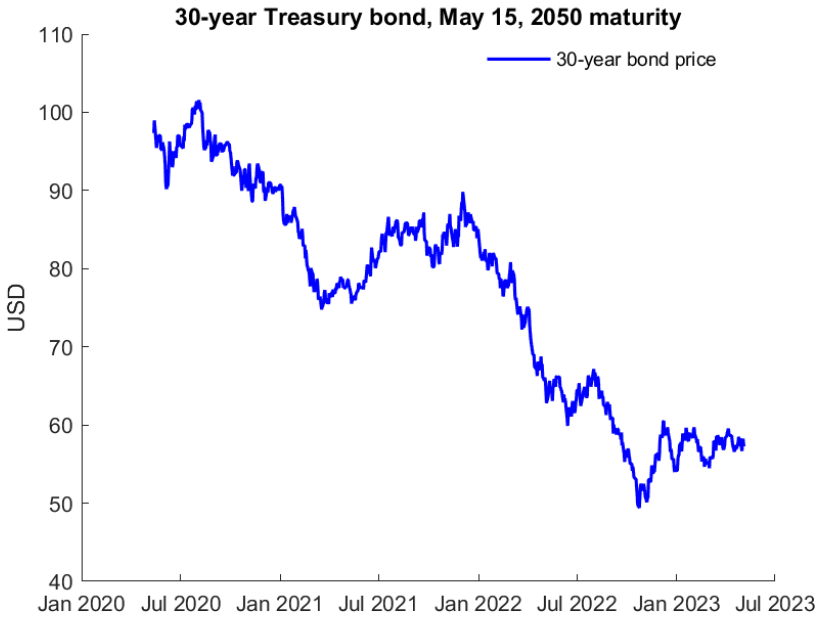

Figure 5: 30-year Treasury Bond Price. The chart shows the dollar price of the 30-year Treasury bond maturing on May 15, 2050. Source: Bloomberg.

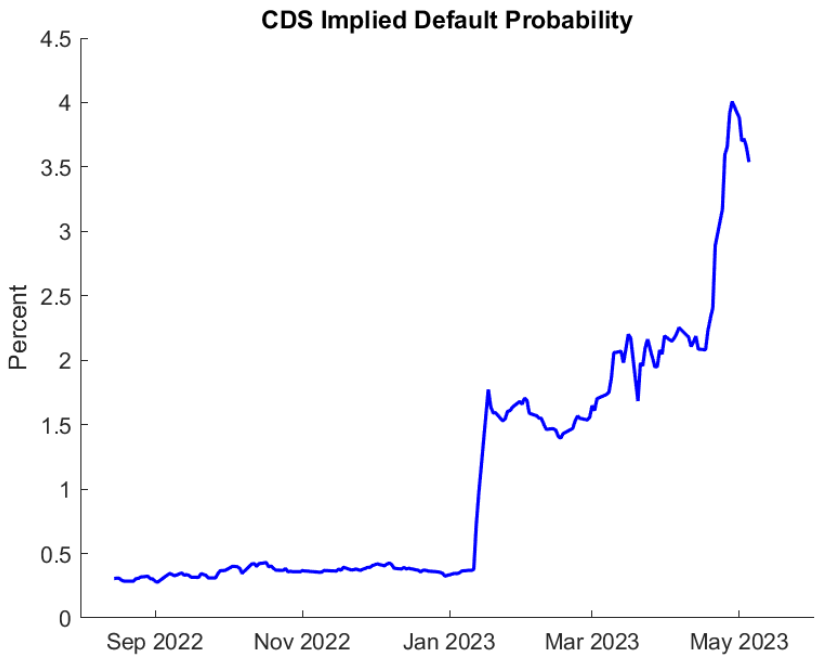

Figure 6: U.S. Default Probability. The chart shows the likelihood of a U.S. default implied by the time series of the 1-year U.S. CDS premiums.

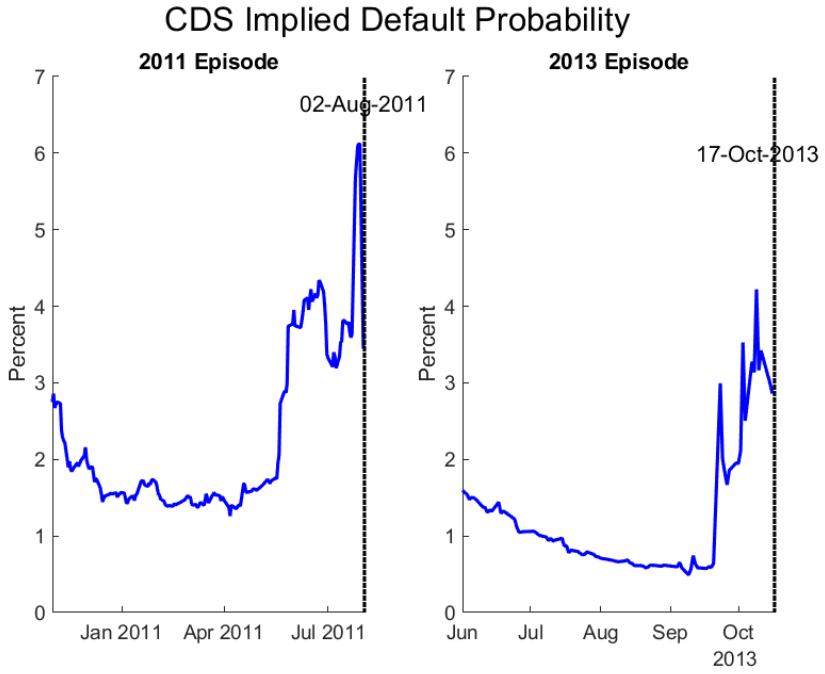

Figure 7: U.S. Default Probability: 2011 and 2013 Debt Ceiling Episodes. The chart shows the likelihood of a U.S. default in the months leading up to the 2011 and 2013 debt ceiling episodes.

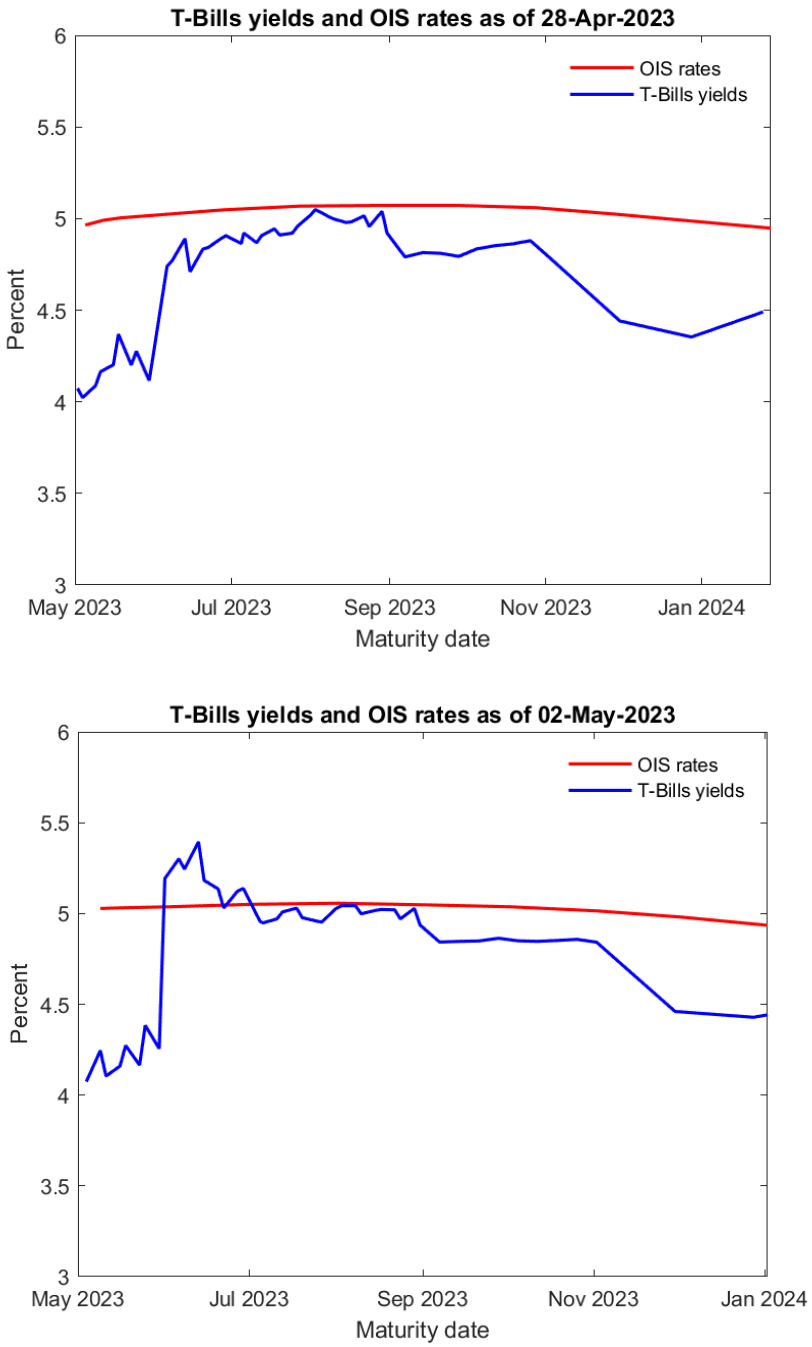

Figure 8: The Term Structures of Treasury Bills Yields and OIS Rates. The chart shows the term structures of Treasury bills yields and OIS rates maturing around the summer of 2023, computed as of April 28, 2023 (top panel) and May 2, 2023 (bottom panel). Source: Bloomberg.