

All the Credit®, Ep. 46

Transcript

[Music]

Female Voice: You're listening to *All the Credit*®, a monthly podcast series brought to you by PGIM Fixed Income, an active global fixed income investment manager.

Brian Barnhurst, CFA, Co-Head of Credit Research: Hello, and welcome to *All the Credit*®. I'm Brian Barnhurst, Co-head of Global Credit Research. Our topic today needs no introduction. Perhaps the most frequently discussed, debated and considered of the last two years, developed market interest rates. I'm fortunate to be joined by Mick Meyler, our Head of Developed Market Rates, and Tom Porcelli, our Chief U.S. Economist. Mick, Tom, welcome to the podcast. Got a lot of ground to cover, so let's jump right in. Rates have reset sharply higher during the past 18 months and we believe they'll stick. What are the core factors supporting our view of higher-for-longer?

Tom Porcelli, Chief U.S. Economist: Why don't I lay the macro framing of that and then Mick can dive in on more market-orientated idea? I mean, look, I think where this first came from is the Fed. And the Fed was very much pushing this higher-for-longer idea. They were obviously doing this on the back of incredibly elevated inflation. And so, they wanted the market to sort of really buy into the idea of not so much that they were just going to continue to sort of drive funds higher, but more that you were putting a floor underneath funds. I think that's an important idea. And what I would say, I think the Fed was pretty effective in their narrative in that regard because I think the market responded. I think there were other elements that were happening and I'll let Mick get into all of that. But I think as it relates specific to the fundamentals of that, this is entirely sort of the makings of the Fed. Now, I would say I have a lot of sympathy for this idea because it's not like I think we're about to sort of slip into a recession. I think that we have elevated odds of recession, but I think we're able to skirt that. And I think in our "weakflation" scenario, right, this idea that you get to pretty well below trend growth, inflation remains north of target. Even if the Fed cuts rates, which, just to be clear, we expect that they will next year, right? Even in our base case scenario of this weakflation, we expect the Fed will cut, but we don't expect that it'll be some big aggressive easing cycle because it's not going to be some big aggressive slowing. So even in a scenario where you do not get into a recession, the Fed cuts rates, but it'll be modest enough where I think sort of the parameters of higher for longer remain in place.

Mick Meyler, Head of Developed Market Rates: Yeah. I mean, Tom, I think that's really in line with kind of how we're thinking about it. Just to put a little bit of a historical perspective on it, from the financial crisis all the way to COVID, we spent the bulk of the time at zero for the Fed, the zero lower bound, and 10-year yields averaged about 2%. When we look at it, and Robert Tipp actually put out a great paper on this back in August, titled *From Low Ranger to High Plains Drifter*, where he laid out in a lot of detail the arguments for this. But a normal rate environment, if you take a longer perspective, has a 10-year yield significantly higher than 2%, and that ties into a higher Fed funds rate. And if you have a significantly higher Fed funds rate and you're not going to be moving back down to zero, the 10-year yield is arguably supposed to be significantly higher. And then that gets to a question of how high. We've said 3% to 5% longer term, and shorter term, right now we're saying four to 5% seems like a pretty reasonable level for the 10-year yield.

Tom: As he always does, Mick is making a great point. The one thing I would say is—and we were just talking about this actually, the Econ team—so we have a 25% probability of recession in the coming year, which I don't know if that sounds elevated or not to most of the listeners here. I hope it sounds elevated because it is, right? I mean, steady state for a recession is 10%. So, we're 2.5x steady state at our 25%. But we were saying even if a recession does materialize, we don't see it as being sort of a deep slowing. And so, I think you talk about recession and I think that immediately conjures this idea of getting to the zero lower bound. But I hope people are aware that the zero lower bound is reserved for dramatic events. Now, it just so happens that we've had two dramatic events 10 years apart. I mean, that's atypical to say the least, right, the Great Financial Crisis (GFC) and the pandemic. But short of some outcome like either of those playing out, the Fed almost never cuts rates to zero. So, if you're going to have a shallow slowing in our recession scenario, even then we still don't think the Fed needs to get that aggressive with cutting—again in that relative sense.

Brian: So, we're having this discussion on the heels of a lighter CPI print that's really stoked the disinflation narrative and has seemingly validated the Fed pause. We saw the entire U.S. rates curve rally pretty sharply in response. In super rough numbers the two years at about 490, the 10 years at about 445, 450. Curve still mildly inverted. But that 2s 10s inversions that flattened by more than half to roughly 45, 50 basis points from a 100+ six months ago. So, a two part question here. Are we at the end of the hiking cycle as the market seems to be suggesting? And then part two is what's the right curve shape looking forward?

Tom: Why don't I take the end part and Mick, you'll take the curve shape part? I think yes, I would say emphatically, yes, we're at the end of the hiking cycle. And Brian, I think you're quite right to highlight CPI. I'd want to make sure all the listeners appreciate our broader view on this. We did not arrive at this is the end of the hiking cycle because of a CPI report. We arrived at this conclusion after the last—in fact, leading into the last hike, we said that would be the last hike. We've been pretty emphatic on that point. The Fed has now put nearly 550 basis points of tightening into an economy that is slowing, right? I mean, look at labor, labor is slowing. So, it would take a dramatic upside to inflation from here, I think, for the Fed to restart hikes. I mean, just to throw as much cold water as I can on that idea, I mean it would take, I don't want to say an implausible scenario, but it's one that I can't reasonably craft to make an argument for the Fed to push rates higher. I think Powell at this point is really worried about the rise that we've seen in financial conditions. I mean, he's not going to say this explicitly. I mean, he has said he's explicitly worried about the rise in financial conditions, but I think the one thing catching their attention is the reality that labor is slowing down, right? That's not a guess and I'm happy to get into more detail on that. And I think in the context of all of the hikes that they've put in place, I think that they do want to now sit back and to use Powell's words, use their eyes and a little bit of risk management to sort of see what the next move will be. We think the next move will be a cut. But yes, the short answer is we see incredibly limited possibility for the Fed to raise from here.

Mick: Tom, it's interesting because that's kind of what the market is pricing now too, right? When you look at Fed pricing, there's really almost no activity priced in for the next call it three to six months. And then you go on a pretty gradual easing path and eventually if you look at the forwards in kind of softer space or wherever, you get down to about a 375 or a 370 level a couple of years forward. So, it's a pretty slow path, but it's not priced to go nearly as low as it was just during the Silicon Valley banking crisis. It looks like a pretty gradual path. And so, when we look at that, I guess maybe I lean towards their willingness to cut is going to be maybe not super high. When they cut, they're going to have to say, yes, we've beaten inflation, or we are convinced that we're definitely restrictive and that we've got the inflation genie in the bottle. So, I don't really disagree that we're looking at six months kind of at this level and the last hike is in. In terms of the shape of the curve I think a lot of it has to do with the Fed. And then supply, certainly treasury supply is going higher. The deficit is not really coming down in a material way. And so, we're going to get a lot more issuance. And I think the shape of the curve to some extent is going to be determined by how the treasury decides to issue bonds. In their most recent refunding, they reduced the speed of the increase in the long end and moved to more issuance in the short end. I think there's a lot of demand in the short end, so that makes sense. But as

you move forward and you get more supply, I could certainly see a case for the three and five-year note sticking around lower levels and then having an upward sloping curve out to 10s and 30s. Most of that is not due to the expectation that the Fed cuts and then has to hike again, but really just to digest the supply.

Brian: If it is the end of the Fed hiking cycle historically that's coincided with lower treasury vol, and we've certainly seen anything but of late. Question for you, Mick is this time different?

Mick: The short answer is yes. And the difference comes from the fact that this was such an aggressive hiking cycle. So, when we go back to what most of us have experienced in our lifetimes of trading, the hiking cycles tended to be 25 basis points at a clip. And it was a really clear path with maybe the end level of where the Fed hiked to as the unknown. But the path towards getting there pretty clearly communicated. This hiking cycle was anything but that. You really have to go back a long ways to see 75 basis point clips and jumping from 25 to 50 to 75. And so, the speed of the hike cycle and the unpredictability of the hikes, I think, really left a lot of people uncertain about where the final level was going to get to and what the path looked like. And that was a very high vol world. And so, I think there's a recency bias. And when you come from a really high vol world, there is some scarring people that were under hedged or exposed to risks that they maybe didn't fully appreciate. And so vol tends to stay high for a little bit longer. Having said all that, once you do get into some stability on the Fed funds rate, or if, as Tom mentioned, you get this gradual cutting cycle which they would probably call adjustments, that's probably a significantly lower ball world and that's probably more typical to what we've seen in previous hiking cycles. So, a little hesitant to say peak vol is behind us, but I think we're either there or coming very close to the moment of peak interest rate volatility. And it's likely that looking forward vol is at a lower level.

Brian: Mick, you said an interesting thing as it relates to rates in terms of moving away from recency bias. I think the key theme of the last probably two years post COVID is unanchoring from a lot of different notions held during sort of the zero-interest rate timeframe post-GFC. You also mentioned treasury supply is supportive of higher rates. It's certainly discussed very frequently but much harder to quantify. How do you dimension the potential impacts to long rates from higher supply to fund fiscal deficits? What's the right way to think about that?

Mick: Yeah, so Brian, that's a really good question and it's a really topical question that actually ties into a lot of other things that are going on now with regard to even regulation and margin requirements on treasuries, potentially central clearing of treasuries. And when I look at it, one of the things that comes to mind often is to take down treasuries you need balance sheet. And so, the Fed was certainly very involved and provided balance sheet in times of stress in the past. Now we're moving to a world where the Fed is certainly reducing its balance sheet through quantitative tightening and other balance sheet has to be dedicated to the treasury market and you'll have to find the right clearing level in terms of where are end investors willing to take down and deploy cash to actually buy treasuries. So certainly, what we've seen in the recent sell-off and even in the last 30-year auction that tailed about five basis points is it doesn't seem we're at that equilibrium spot right now and that that balance sheet is readily available. I see a lot of things on the horizon that could make balance sheet more scarce which I think would lead to cheaper treasuries versus either swaps or futures and potentially also to a steeper curve. So, I think it's a great question. It's a really timely question and I think it's multifaceted. But I think if you look at the basic question of who wants the treasuries, what part of the yield curve are they looking for? Where do they want to deploy their cash? What are the systematic rigidities that would maybe exacerbate increased supply? I think you're looking in the right direction and I'm not sure the answer is really easy until you kind of work your way through solving some of those problems.

Brian: If we zoom out now and just think about the medium term, what's your perspective on the right range for 10-year yield and what drives either side of that range?

Mick: Broadly speaking, we're talking about a 4% to 5% range, which I think is again a pretty wide range from historical standards, but volatility is so high that I'm not even making an outlier call in terms of where the range could be, certainly not relative to implied volatility. And when we look at that, I think you have to

say there's a number of factors that are going to drive this inflation growth, what the Fed decides to do supply, and then is there an exogenous shock, and the exogenous shock could be positive or negative. If we get continued really strong growth, if we see some kind of productivity increase, maybe we move to the higher end of the range, maybe we even break through the range a little bit. And certainly, on the other side, the scenarios are easier, right? A hard recession, something that causes a big change in the value of equities, something that brings the Fed in and causes a more aggressive easing cycle than kind of our base case or even some of our more extreme scenarios, those would all drive treasuries outside of that range.

Tom: The only thing I would add to that is, you can make forecasting anything as complicated as you want, and this is true for 10-year yields as an example. I think for anyone listening to this, there's always a sort of a foundation, right? There's a base level that you need to start at. The base level for forecasting anything across the curve is, what do you think Fed funds will average over that time? So, if you're trying to make a forecast for 10-year yields, the starting question that you need to ask yourself is, and let me digress for a second, forecasting anything over 10-years is incredibly complicated—I mean, forecasting anything over a year is complicated. I'm just saying, if you want a construct to think about this, the construct is what will Fed funds average for the next 10 years? When I think about that, 4% feels like a pretty right number as a starting point for the conversation. Then you build in some term premium, and again, you can make it as complicated as you want, but I think that's a useful framing for how do you tackle that.

Brian: Tom, earlier you detailed our house view of weakflation, 25% chance of recession at the macro level. That's kind of consistent with the market's perspective. I think the market sort of resigned to this notion of '24 is either below trend growth or outright contraction. But I want to probe another scenario, which is a reacceleration of growth in the second half of '24 and pick your factor, your driver. It could be higher productivity, whether it's induced by AI or otherwise. When I look at the bottom up, there's been a consistent theme of destocking through '23. It may not take a whole lot of uptick in growth to pull a restocking cycle through whether it's manufacturing chemicals or otherwise. Or I could talk about U.S. elections in '24, what a Trump presidency may mean for growth or for the rates market, things like tax cuts, fiscal stimulus come to mind, however ill advised that may be from a fiscal deficit standpoint. I guess the question for both of you is how do you think about the behavior of rates in an environment where growth reaccelerates in the second half of '24?

Tom: Let me pick up on the idea of what it would take to get there, what it would take for growth to really sort of reaccelerate. Because look—and you both know this and most folks internally know this and whoever I've spoken to externally know this too. I've been spending a lot of time talking about our base case and a lot of time talking about the left tail risk, right? The left tail, of course, being the downside risk. That's done very purposefully because we have high probabilities assigned to both of those outcomes. And I think it's right to be focused on the base case always but then focus on this left tail risk because I think it's pretty fat tail. I do think that there's real reasonable prospect for growth to accelerate. I think unfortunately, you might have to go through the left tail before you get to the right tail. But I really like our right tail scenario. And how do you get there? I think you get there in part from a productivity boom. And I have argued that I think the pieces are in place for that to happen. Now, again, I will say this probably more than once in this response. This will take time. This is not something that's going to happen in the next couple of quarters. But if I think about some of the pieces and again, I don't want to belabor this point too much, but it's just worth laying this out a little bit. I think you can make the argument that the pieces were put in place for a potential productivity boom going back to the trade war. And I think it really got companies wondering aloud about, “OK, where do I want my supply chain to start?” Fast forward to the pandemic, I think the pandemic really accelerated the conversation, right? It really got them wondering, “OK, do I want to onshore, nearshore?” And all the while as companies are having these conversations which make no mistake is ongoing and some have already executed on this. But all the while companies are acutely aware if you do on or nearshore or if you do move from a low cost provider, what potentially comes is inflation. And companies know this. And I think what companies want to do is try to mitigate that as much as they can. So how do they do that? Well, they do that

by investing in technological advancement that allows them to avoid it. So the avoidance of inflation on the backup productivity, I mean, these are all part and parcel of the same idea. Companies know that they are incentivized to engage in that. I think you can layer in the AI idea. We all appreciate that that's happening and that's another idea that's going to take time. But if I just lump these ideas together broadly just to give you a couple of quick things, if you think about it in that sense, yeah, I think the pieces are there for productivity to really perform well. And just to say this one last thing, we need that, right? I mean, as an aging population, trend growth tends to slow down. Now there's some evidence right now that older age cohorts are actually doing a pretty reasonable amount of spending more than I think some people would appreciate. But I think that's also in part because we're coming out of a pent-up demand scenario. I do think that trend rates of growth tend to slow down as a population ages. And again, that's where this productivity idea could really come in very, very handy.

Mick: I think—and this is with respect to kind of like a Trump presidency, right? I think you would have to look at it and say it's going to be a repeat of what we saw before, which is I don't think we'd see greater fiscal discipline. I think we'd see an increase in military spending. We'd probably see another effort at tax cuts and that doesn't really make the debt problem any better. So, in terms of treasury pricing in that environment, I got to imagine that we see the long end of the yield curve underperform and maybe really tension out kind of bear the brunt of any kind of increase in expenditure, decrease in revenue. I don't think they're going to be backend positive in any way.

Tom: And Mick makes a really fantastic point and it's just worth amplifying. I think people think of each party—each political party and sort of one is more willing to spend and the other is more willing to sort of rein in spending. That's just simply not the reality anymore. It almost doesn't matter who's in office, whether it's a Republican or a Democrat, they're all willing to sort of go down the spending path. So, when we look at the CBO forecast of the deficit—deficits for as far as the eye can see, it's really easy to believe in that idea in that regard.

Brian: I couldn't agree more, Tom. OK. We're going to move to a rapid fire segment where I'd love to get both of you to respond to each question in very short form and we'll try to move pretty quickly. Timing of the first cut and what triggers it? Mick?

Mick: I'll say September of 2024. So, third quarter of '24 and slightly lower than expected inflation. So, sub 2% core inflation.

Brian: Tom?

Tom: So, we're definitely a little off on the timing. I think it could be earlier. I think it could be call it Q2 of the coming year. And I think the trigger—Powell will tell you that the trigger is that, well, inflation is invading and et cetera. But I think at the end of the day as I've said many times, Powell is a dove for labor. And I think once labor notably starts to slow from here, I think that's going to be the real trigger for him.

Brian: Total cuts in '24 and Fed funds at year end '24?

Tom: Seventy-five basis points for me.

Mick: All right. And I got 50, and that puts it at 475 for year-end 2024.

Brian: Ten-year at the end of '24. Mick?

Mick: So, I love this question because there's no way that I'm going to be right. I love a point estimate at one point in the future, so that one for me is an easy one, and I'll go with 465.

Tom: I love that level of precision. And that's why Mick does what he does. I'll say even round numbers 450.

Brian: And here's a tricky one, curve shape one year forward.

Mick: So, I guess I've got it slightly inverted because I said the Fed funds rate is going to be 475 and I got the 10-year at 465. So, I'll say 2s 10s slightly inverted, and then the long end slightly cheaper.

Tom: So, again, Mick just given our timing mismatch, I would say you're probably slightly positive.

Brian: Tom, Mick, we've covered a lot of ground today. Any last thoughts before we wrap up?

Mick: I think the one thing about this discussion, it's been really U.S. focused. It's no longer a U.S. local market. We're trading global markets. And when we look at the rest of the world, China has some pretty severe headwinds. And I think while we're debating what the Fed's going to do, the Fed is kind of the bell of the ball. When you look at Europe and when you look at the Bank of England, they're both in trickier spots. China is in a trickier spot. And when you look at the Bank of Japan, they're just beginning to remove accommodation after really an unprecedented amount of accommodation in the preceding 15 to 20 years. So this has been mostly about the U.S. But I think when you look even broader, the conversation becomes that much more interesting.

Tom: Yeah, I would agree with that. If I was just to latch onto that idea, because, again, it's an important one. And for the most part, the U.S. tends to be uncorrelated to what's happening outside of our borders, tends to. As long as something doesn't become a systemic event, right? As long as it's more of—and I hate to use the word standard, but for lack of a better phrase—as long as it's a standard slowing or policy reaction in other countries, the U.S. can tend to sort of come out of that relatively unscathed. But I think Mick's point is really well-taken in that we are becoming ever more intertwined and that is something that, particularly for mixed space, will show through in markets faster than I think it would potentially show through in the U.S. economic backdrop.

Brian: Tom, Mick, this has really been great. Thank you so much for your perspectives.

Mick: Great. Thanks, Brian.

Tom: Thank you.

Brian: For our listeners, you can find more of our thought leadership, latest research, and The Bond Blog on our website, pgimfixedincome.com. Thanks again for listening.

[Music]

Female Voice: We hope you enjoyed today's podcast. Subscribe to keep up with the latest episodes of *All the Credit*®. For more insights on thought leadership visit pgimfixedincome.com. Have an idea for a podcast topic or guest? Email us at fixedincomerequest@pgim.com. or email your account manager or sales representative at PGIM Fixed Income. This podcast is intended solely for professional investor use. Past performance is not a guarantee of future results. All investments involve risk including the loss of capital. This material is not for distribution to any recipient located in any jurisdiction where such distribution is unlawful. This podcast includes the views and opinions of the authors and may not reflect PGIM Fixed Income's use. PGIM and its related entities may make investment decisions that are inconsistent with the views expressed herein. This podcast should not be reproduced without PGIM's prior written consent. No liability is accepted for any direct, indirect, or consequential laws that may arise from the use of any information contain in or derived from this podcast. PGIM Fixed Income is not acting as your fiduciary. The contents are for informational purposes only, are based on information available when created and are subject to change. It is not intended as investment, legal, or tax advice and does not consider a recipient's financial objectives. PGIM Fixed Income is a business unit of PGIM, the global asset management business of Prudential Financial Inc. which is not affiliated in any manner with Prudential PLC Incorporated in the United Kingdom or with Prudential Insurance Company, a subsidiary of M&G plc Incorporated in the United Kingdom, Copyright 2023. The PGIM logos and the Rock symbol are service marks of PGIM and its related entities registered in many jurisdictions worldwide.

IMPORTANT INFORMATION

Source(s) of data (unless otherwise noted): PGIM Fixed Income, as of September 21, 2023.

For Professional Investors only. Past performance is not a guarantee or a reliable indicator of future results and an investment could lose value. All investments involve risk, including the possible loss of capital.

PGIM Fixed Income operates primarily through PGIM, Inc., a registered investment adviser under the U.S. Investment Advisers Act of 1940, as amended, and a Prudential Financial, Inc. (“PFI”) company. Registration as a registered investment adviser does not imply a certain level or skill or training. PGIM Fixed Income is headquartered in Newark, New Jersey and also includes the following businesses globally: (i) the public fixed income unit within PGIM Limited, located in London; (ii) PGIM Netherlands B.V., located in Amsterdam; (iii) PGIM Japan Co., Ltd. (“PGIM Japan”), located in Tokyo; (iv) the public fixed income unit within PGIM (Hong Kong) Ltd. located in Hong Kong; and (v) the public fixed income unit within PGIM (Singapore) Pte. Ltd., located in Singapore (“PGIM Singapore”). PFI of the United States is not affiliated in any manner with Prudential plc, incorporated in the United Kingdom or with Prudential Assurance Company, a subsidiary of M&G plc, incorporated in the United Kingdom. Prudential, PGIM, their respective logos, and the Rock symbol are service marks of PFI and its related entities, registered in many jurisdictions worldwide.

These materials are for informational or educational purposes only. The information is not intended as investment advice and is not a recommendation about managing or investing assets. In providing these materials, PGIM is not acting as your fiduciary. PGIM Fixed Income as a general matter provides services to qualified institutions, financial intermediaries and institutional investors. Investors seeking information regarding their particular investment needs should contact their own financial professional.

These materials represent the views and opinions of the author(s) regarding the economic conditions, asset classes, securities, issuers or financial instruments referenced herein. Distribution of this information to any person other than the person to whom it was originally delivered and to such person’s advisers is unauthorized, and any reproduction of these materials, in whole or in part, or the divulgence of any of the contents hereof, without prior consent of PGIM Fixed Income is prohibited. Certain information contained herein has been obtained from sources that PGIM Fixed Income believes to be reliable as of the date presented; however, PGIM Fixed Income cannot guarantee the accuracy of such information, assure its completeness, or warrant such information will not be changed. The information contained herein is current as of the date of issuance (or such earlier date as referenced herein) and is subject to change without notice. PGIM Fixed Income has no obligation to update any or all of such information; nor do we make any express or implied warranties or representations as to the completeness or accuracy.

Any forecasts, estimates and certain information contained herein are based upon proprietary research and should not be interpreted as investment advice, as an offer or solicitation, nor as the purchase or sale of any financial instrument. Forecasts and estimates have certain inherent limitations, and unlike an actual performance record, do not reflect actual trading, liquidity constraints, fee. These materials are not intended as an offer or solicitation with respect to the purchase or sale of any security or other financial instrument or any investment management services and should not be used as the basis for any investment decision. PGIM Fixed Income and its affiliates may make investment decisions that are inconsistent with the recommendations or views expressed herein, including for proprietary accounts of PGIM Fixed Income or its affiliates.

Investing in the **bond market** is subject to risks, including market, interest rate, issuer, credit, inflation risk, and liquidity risk. The value of most bonds and bond strategies are impacted by changes in interest rates. Bonds and bond strategies with longer durations tend to be more sensitive and volatile than those with shorter durations; bond prices generally fall as interest rates rise, and low interest rate environments increase this risk. Reductions in bond counterparty capacity may contribute to decreased market liquidity and increased price volatility. Bond investments may be worth more or less than the original cost when redeemed. **Mortgage- and asset-backed securities** may be sensitive to changes in interest rates, subject to early repayment risk, and while generally supported by a government, government agency or private guarantor, there is no assurance that the guarantor will meet its obligations. **High yield, lower-rated securities** involve greater risk than higher-rated securities; portfolios that invest in them may be subject to greater levels of credit and liquidity risk than portfolios that do not. Investing in **foreign-denominated and/or -domiciled securities** may involve heightened risk due to currency fluctuations, and economic and political risks, which may be enhanced in emerging markets. Currency rates may fluctuate significantly over short periods of time and may reduce the returns of a portfolio. **Commodities** contain heightened risk, including market, political, regulatory and natural conditions, and may not be suitable for all investors. **Diversification** does not ensure against loss.

In the **United Kingdom**, information is issued by PGIM Limited with registered office: Grand Buildings, 1-3 Strand, Trafalgar Square, London, WC2N 5HR. PGIM Limited is authorised and regulated by the Financial Conduct Authority (“FCA”) of the United Kingdom (Firm Reference Number 193418). In the **European Economic Area** (“EEA”), information is issued by PGIM Netherlands B.V., an entity authorised by the Autoriteit Financiële Markten (“AFM”) in the Netherlands and operating on the basis of a European passport. In certain EEA countries, information is, where permitted, presented by PGIM Limited in reliance of provisions, exemptions or licenses available to PGIM Limited including those available under temporary permission arrangements following the exit of the United Kingdom from the European Union. These materials are issued by PGIM Limited and/or PGIM Netherlands B.V. to persons who are professional clients as defined under the rules of the FCA and/or to persons who are professional clients as defined in the relevant local implementation of Directive 2014/65/EU (MiFID II). In **Switzerland**, information is issued by PGIM Limited, London, through its Representative Office in Zurich with registered office: Kappelergasse 14, CH-8001 Zurich, Switzerland. PGIM Limited, London, Representative Office in Zurich is authorised and regulated by the Swiss Financial Market Supervisory Authority FINMA and these materials are issued to persons who are professional or institutional clients within the meaning of Art.4 para 3 and 4 FinSA in Switzerland. In certain countries in **Asia-Pacific**, information is presented by PGIM (Singapore) Pte. Ltd., a regulated entity with the Monetary Authority of Singapore under a Capital Markets Services License to

conduct fund management and an exempt financial adviser. In **Japan**, information is presented by PGIM Japan Co. Ltd., registered investment adviser with the Japanese Financial Services Agency. In **South Korea**, information is presented by PGIM, Inc., which is licensed to provide discretionary investment management services directly to South Korean investors. In **Hong Kong**, information is provided by PGIM (Hong Kong) Limited, a regulated entity with the Securities & Futures Commission in Hong Kong to professional investors as defined in Section 1 of Part 1 of Schedule 1 of the Securities and Futures Ordinance (Cap.571). In **Australia**, this information is presented by PGIM (Australia) Pty Ltd (“PGIM Australia”) for the general information of its “wholesale” customers (as defined in the Corporations Act 2001). PGIM Australia is a representative of PGIM Limited, which is exempt from the requirement to hold an Australian Financial Services License under the Australian Corporations Act 2001 in respect of financial services. PGIM Limited is exempt by virtue of its regulation by the FCA (Reg: 193418) under the laws of the United Kingdom and the application of ASIC Class Order 03/1099. The laws of the United Kingdom differ from Australian laws. In **Canada**, pursuant to the international adviser registration exemption in National Instrument 31-103, PGIM, Inc. is informing you that: (1) PGIM, Inc. is not registered in Canada and is advising you in reliance upon an exemption from the adviser registration requirement under National Instrument 31-103; (2) PGIM, Inc.’s jurisdiction of residence is New Jersey, U.S.A.; (3) there may be difficulty enforcing legal rights against PGIM, Inc. because it is resident outside of Canada and all or substantially all of its assets may be situated outside of Canada; and (4) the name and address of the agent for service of process of PGIM, Inc. in the applicable Provinces of Canada are as follows: in **Québec**: Borden Ladner Gervais LLP, 1000 de La Gauchetière Street West, Suite 900 Montréal, QC H3B 5H4; in **British Columbia**: Borden Ladner Gervais LLP, 1200 Waterfront Centre, 200 Burrard Street, Vancouver, BC V7X 1T2; in **Ontario**: Borden Ladner Gervais LLP, 22 Adelaide Street West, Suite 3400, Toronto, ON M5H 4E3; in **Nova Scotia**: Cox & Palmer, Q.C., 1100 Purdy’s Wharf Tower One, 1959 Upper Water Street, P.O. Box 2380 - Stn Central RPO, Halifax, NS B3J 3E5; in **Alberta**: Borden Ladner Gervais LLP, 530 Third Avenue S.W., Calgary, AB T2P R3.

© 2023 PFI and its related entities.