BARCLAYS

Special Report | Research
6 March 2020

US Macro Research

What comes next? Understanding the potential monetary and fiscal tool kits

Michael Gapen
+1 212 526 8536
michael.gapen@barclays.com
BCI, US

Shawn Golhar
+1 212 526 0172
shawn.golhar@barclays.com
BCI, US

Joseph Abate*
+1 212 412 7459
joseph.abate@barclays.com
BCI, US

www.barclays.com

- **Following the intermeeting 50bp cut from the Federal Reserve, financial markets continue to price in additional policy rate easing: about 50bp of rate cuts for the March FOMC meeting and about another 15bp at the April meeting. Over the next year, federal funds futures contracts imply almost 70bp of cumulative rate cuts, or a nontrivial probability of hitting the zero lower bound (ZLB).**

- **Proximity to the zero lower bound raises the question, "What comes next?" We provide our thoughts on measures in the monetary and fiscal tool kits that could be implemented should economic conditions warrant more policy stimulus than can reasonably be provided through interest rate policy alone.**

- **Following any move to the ZLB, we think the Fed would prefer yield curve control (YCC) over large-scale asset purchases, though Fed bill purchases could be extended beyond Q2 to promote reserve abundancy. In addition to a potential shift to makeup strategies under inflation averaging, YCC could help reinforce forward guidance. We doubt the Fed is actively considering negative policy rates.**

- **The Fed could take a number of steps to improve liquidity, credit provision, and market functioning. The capacity of overnight and term rep facilities could be increased, pricing on FX swap lines could be reduced, and financial stress could lead to a reopening of the Primary Dealer Credit Facility. Should credit to households or business become constrained, crisis-era liquidity facilities such as the TAF and TALF could also be resurrected.**

- **On the fiscal policy front, Congress and the administration passed a $8.3bn emergency funding package to combat the outbreak of the coronavirus. If the situation worsens and localized outbreaks threaten to overwhelm local health care providers, we believe it would pass additional emergency funding that could flow to state and local government to cover health care outlays. Payroll tax cuts are a quick and relatively efficient way to inject stimulus for consumers, particularly if the unique characteristics of the COVID-19 mean traditional forms of stimulus via rate cuts prove ineffective. Another advantage of a payroll tax cut is its progressivity, which could mean resources are directed to households with a higher propensity to spend.**

- **The outbreak may lead to increased funding for the Center for Disease Control and Prevention (CDC), National Institute of Health (NIH), and programs such as "Predict," which are viewed by many specialists as essential for long-term preparedness. That said, we would characterize these measures as part of the post-outbreak response, not as part of any emergency spending package.**

** This author is a debt research analyst in the Fixed Income, Currencies and Commodities Research department and is neither an equity research analyst nor subject to all of the independence and disclosure standards applicable to analysts who produce debt research reports under U.S. FINRA Rule 2242.*

A virus outbreak and "material risks" to the US outlook

When the Federal Reserve initiated an emergency intermeeting 50bp rate cut, taking the target range for the federal funds rate to 1.0-1.25%, it justified the action by *saying* the "coronavirus poses evolving risks to economic activity." In his press conference, Chair Powell said the situation was fluid and uncertain, but the committee saw downside risk as material enough to warrant monetary easing.

Following the decision, financial markets continue to price in additional policy rate easing: about 50bp of rate cuts for the March FOMC meeting and about another 15bp at the April meeting. Over the next year, federal funds futures contracts imply a nontrivial probability of hitting the zero lower bound. We agree that further monetary easing is likely forthcoming and expect 50bp of further rate cuts, with 25bp cuts at both the March and April FOMC meetings (see *Until morale improves, the easing will continue*, 3 March 2020).

Given that the Fed has already taken an unscheduled decision and reduced the policy rate 50bp in one step, we think the risk to our view is that it moves in larger increments than we envision. Hence, a 50bp rate cut at the March meeting is a possibility, and a return to the effective zero lower bound later this year cannot be ruled out.

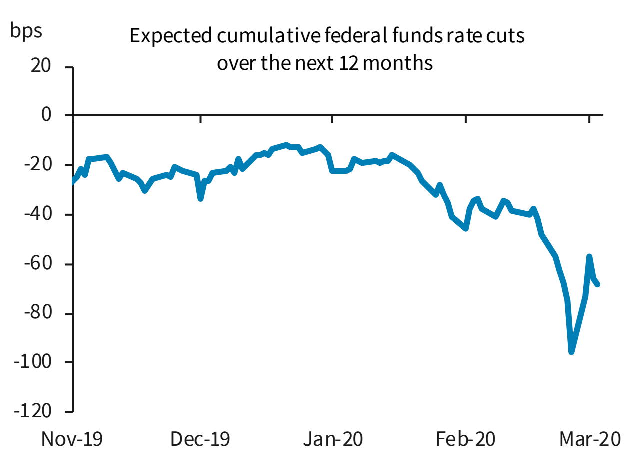
Proximity to the zero lower bound raises the obvious question, "What comes next?" We provide our thoughts on other measures in the monetary and fiscal tool kits that could be implemented should economic conditions warrant more policy stimulus than can reasonably be provided through interest rate policy alone.

After zero, what's next for the Fed?

We lay out the potential options for monetary policy based on our view of Fed preferences. We begin with our views on balance sheet policy, forward guidance, and negative rates. We follow this with potential measures to keep liquidity ample and credit flowing. To be clear, none of these steps or facilities is part of our baseline outlook at present, and we provide them here as part of the broader discussion of the potential policy options.

FIGURE 1

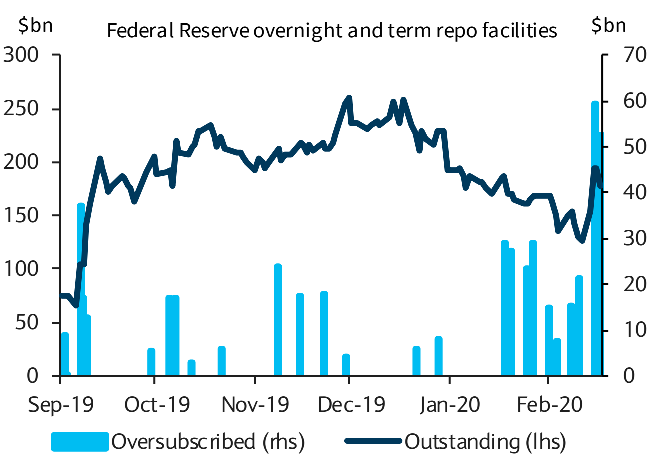
Financial markets expect further easing



Source: Bloomberg, Barclays Research

FIGURE 2

Recent auctions of Fed liquidity have been oversubscribed



Source: Federal Reserve, Barclays Research

- **Yield curve control.** As the federal funds rate was pushed to the zero lower bound in late 2008, the FOMC embarked on large-scale asset purchases to support the economy. With longer-dated interest rates as low as they are (the yield on the 10y US Treasury has fallen below 1.0%), there is not much term premium to capture through outright asset purchases. Hence, we believe the committee would prefer to use yield curve targeting to prevent yields on shorter-dated Treasury notes from rising above prescribed levels. At first, we think the committee would likely target yields on the 2y Treasury note, but could also engage in yield curve control out to 5y depending on conditions.

- **Enhanced forward guidance.** The Fed has been reviewing its communication strategy as part of its ongoing framework review. FOMC meeting minutes that have characterized the status of discussions suggest the committee believes various forms of forward guidance could be appropriate under different situations (eg, subjective language such as "extended period", calendar-based guidance, and outcome-based guidance). One advantage of yield curve control over outright asset purchases would be its potential to strengthen forward guidance about how long the funds rate is expected to remain near zero. The upcoming conclusion of the Fed's framework review could also mean the committee moves to an operational target for inflation as part of a makeup strategy. The upper end of the range could represent a limit on what rate of inflation would be tolerated during a makeup period after an undershoot.

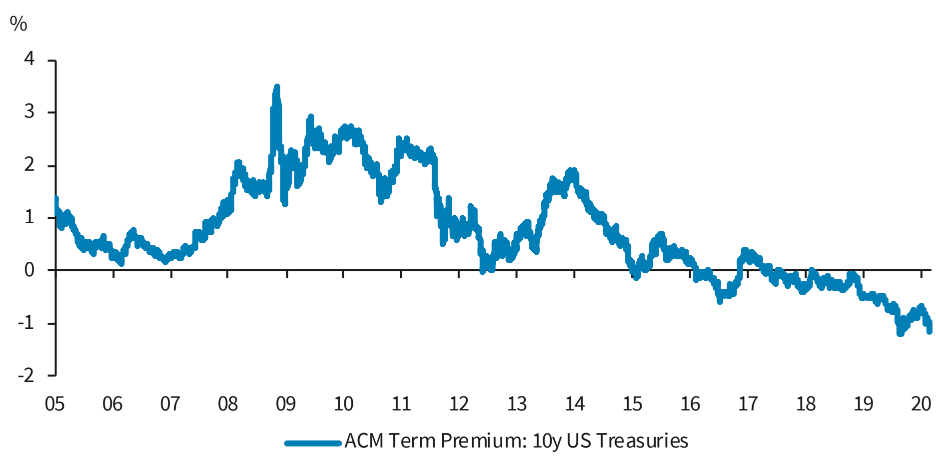
- **Negative rates.** In our view, this is the last potential item on the Fed's agenda. It has not taken negative policy rates off the list of unconventional policy options, but has been fairly clear in signalling it is well down the list of viable policy options to improve the efficacy of policy at the zero lower bound.

On potential tools to support liquidity and market functioning, we identify the following potential options.

- **Market functioning in short-term money markets.** In our view, market functioning and liquidity conditions in short-term funding markets are equally as important as the setting of the policy rate. When initiating the intermeeting 50bp rate cut, the Fed re-affirmed its intent to purchase Treasury bills at a rate of $60bn per month into the second quarter. In addition, the committee said it would continue to offer liquidity through overnight and term repo operations. These operations are likely to keep reserve

FIGURE 3

Large-scale asset purchases may be less effective when term premiums are low

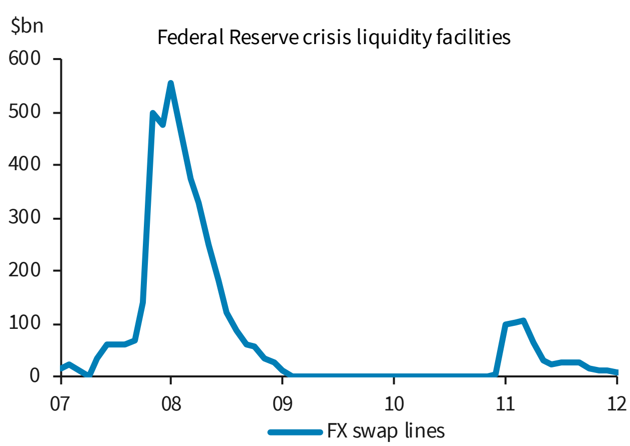


Source: FRBNY, Haver Analytics, Barclays Research balances ample, supporting conditions in short-term funding markets. Recent repo operations have recently been oversubscribed, and we expect the Fed will increase the capacity of these facilities to ensure ample liquidity. Alternatively, the Fed could extend its purchases of Treasury bills beyond Q2 to ensure an abundance of reserves. While this may be viewed by some as QE, we would characterize it as reserve management.

- **Standing repo facility.** Concerns over liquidity conditions and funding stresses could encourage the creation of a standing repo facility (SRF), which would permit banks to convert Treasury holdings to reserves on demand at a predetermined rate. During normal times, the SRF could encourage banks to hold fewer reserves, since Treasuries generally earn more than interest on reserves. The facility would also ensure that banks could fully – and, importantly, immediately – monetize their Treasuries. In periods of stress, when banks may be inclined to hold on to their most liquid balances, knowing that they could easily repo their Treasuries to the Fed throughout the day might make managers more willing to lend out their cash balances (see *Overdrawn: Intraday borrowing and the standing repo facility*, February 7, 2020). In theory, the SRF would not suffer from the stigma associated with discount window borrowing and might become a complement to the Fed's existing overnight and term repo facilities. That said, the committee has not yet reached agreement on basic facility design, such as which entities would be eligible to use the SRF and at what rate. The creation of a standing repo facility may not be high on the Fed's to-do list during a stress event, as it has other, more direct, ways to increase market liquidity.

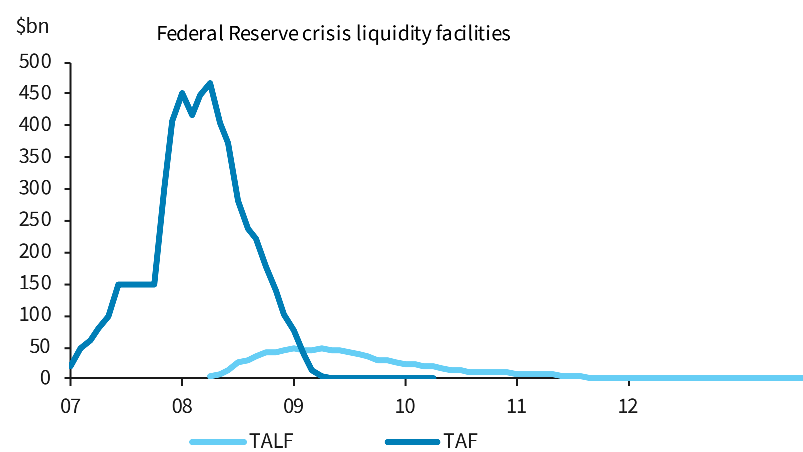
- **FX swap lines.** The Fed has standing arrangements with a number of central banks for liquidity swap lines. These facilities are designed to improve liquidity conditions in the short-term dollar funding market, both in the US and abroad. Non-US banks are able to pledge local currency-denominated loans and securities to their local central bank, which, in turn, borrows dollars that it passes on to the bank. The swap lines facilities work in reverse to improve non-dollar funding markets, as well. In 2013, the temporary FX swap lines were converted to standing arrangements.[1] We are not suggesting these facilities need to be created, but, instead, that pricing on the facilities could be altered to reduce the cost of access. Currently, swap line pricing is OIS plus 50bp.

FIGURE 4
Federal Reserve crisis liquidity facilities…



Source: Federal Reserve, Haver Analytics, Barclays Research

FIGURE 5
…were important during periods of market stress



Source: Federal Reserve, Haver Analytics, Barclays Research

[1] Liquidity swap arrangements are in place between the Fed and the BoC, the BOE, the BoJ, the ECB, and the SNB.

- **Primary Dealer Credit Facility.** We think the Primary Dealer Credit Facility (PDCF) could be useful in promoting the orderly functioning of financial markets. During the financial crisis, the PDCF functioned as an overnight loan facility for primary dealers, similar to the way the discount window provides an emergency backstop source of funding for depository institutions.

- **Term Auction Facility and Term Asset-Backed Lending Facilities.** Should any economic dislocation become severe enough to disrupt the supply of credit to consumers and/or business, the Fed could also restart a few of its crisis liquidity programs. The Term Auction Facility (TAF) was effectively an auction for discount window loans. As a competitive auction, the TAF avoided the stigma associated with direct discount window lending. At the time, it was described as "curtains for the discount window." TAF loans were for 28- and 84-day maturities during the crisis to eligible depository institutions of sound credit against a broad range of collateral. As this is a discount window loan limited to banks, it would not create issues with Dodd-Frank limits on Fed lending. The Term Asset-Backed Lending Facility (TALF) supported credit conditions on a wide array of consumer and business loans (including small business loans, auto loans, credit card loans, student loans, among others). The TALF was undertaken in cooperation with the Treasury, which provided a credit loss protection guarantee to the facility.

After zero, what's next for fiscal?

This week, Congress and the administration passed a $8.3bn emergency funding package to combat the outbreak of the coronavirus response. While the White House originally requested $2.5bn in funding, Congressional appropriators negotiated a significantly larger fiscal package. The size of the emergency funding package for COVID-19 is on par with the $5.4bn Congress appropriated for the Ebola outbreak in 2015 and the $7bn for the H1N1 virus in 2009.

- **Fiscal stimulus: Short-term emergency spending packages.** Should the situation deteriorate further, Congress has additional options, including reconvening and negotiating additional emergency spending packages. While some members may look for fiscal offsets to minimize the effect on the deficit, emergency appropriations do not count against the statutory caps. In our view, if the situation worsens, Congress will not hesitate to pass additional emergency funding, particularly money that could flow to state and local governments to cover health care outlays. The size of any additional short-term emergency spending package would likely be proportional to the number of outbreaks ("hot spots") in the US. The experience of COVID-19 in China suggests that capacity in local health care systems can be overwhelmed rapidly.

- **Fiscal stimulus: Long-term emergency readiness initiatives.** Congress also has the option to tie a portion of future funding to other emergency readiness initiatives. Public health officials have been concerned about pandemic risks for quite some time, and COVID-19 may represent the national security risk they have been concerned about. For example, Congress could authorize the creation of a sustainable financing model for hospital epidemic preparedness (including urgent care facilities and walk-in clinics), boost funding for the CDC and NIH, and restore funding for programs such as "Predict," which are viewed by many specialists as essential for long-term preparedness.[2] At $11.1bn in FY18, the annual budget for the CDC is unchanged from 2015 levels.

[2] The US administration eliminated programs that some argue are necessary to prevent outbreaks that originate in animals, such as COVID-19. One such program, Predict, which was created given the 2005 H5N1 bird flu scare, aimed to identify and research infectious diseases in animal populations in the developing world that might infect humans.

Emergency readiness initiatives could lead to spending above and beyond what is needed to address the current COVID-19 outbreak.

Fiscal stimulus: Tax cuts

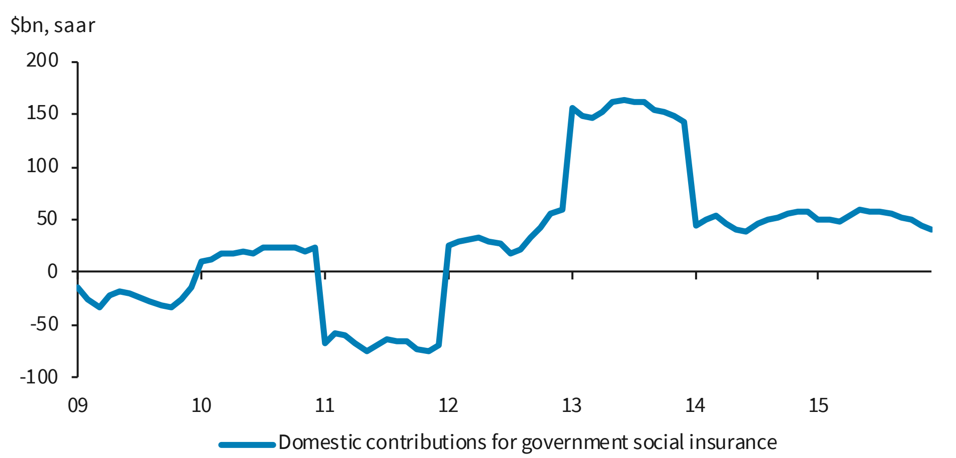
If economic conditions deteriorate, Congress could pass a tax cut quickly. In our view, temporary payroll tax cuts are a quick and relatively efficient way to inject stimulus for consumers, particularly if the unique characteristics of COVID-19 mean traditional forms of stimulus via rate cuts prove ineffective. Another advantage of the payroll tax cut is its progressivity, which could mean resources are directed to households with a higher propensity to spend.

The effectiveness of a payroll tax cut can be improved by "pre-positioning" it. This would be accomplished by triggering the payroll tax rate deduction if the unemployment rate moves up 0.5pp and scheduling the expiration only when the unemployment rate falls below a certain threshold. Tying the duration of the cut to the level of the unemployment rate would create an automatic fiscal stabilizer in the event of an economic downturn.[3] An alternative approach would be to initiate tax rebates following a rise in the unemployment rate.

The payroll tax was reduced by the Obama administration from 2011 to 2012 as part of the 2010 Tax Relief Act. Those cuts halved the rate of payroll taxes rate paid by employees (which, at least nominally, are used to fund the Social Security program) by 2pp, from 6.2% to 4.2%.[4] At the time, the reduction in the payroll tax increased disposable income by about $100bn per year. In principle, such a cut could provide a material jolt to US activity. Given that more Americans are employed today than during the early stages of the economic recovery and the maximum taxable earnings for the payroll tax have risen roughly 25%

FIGURE 6

A 2pp reduction in the payroll tax in 2011-12 boosted disposable income



Source: BEA, Haver Analytics, Barclays Research

[3] See Wilcox, David, "*Designing an effective US policy response to coronavirus*," Peterson Institute for International Economics, Realtime Economic Issues Watch, 3 March 2020.

[4] In principle, the administration could also propose cuts to the Medicare portion of the levy, which is currently set at 1.45% for employers and employees. Unlike the Social Security component, Medicare withholding applies to all wage income, rather than just an employee's first $137.7k of income for the Social Security tax.

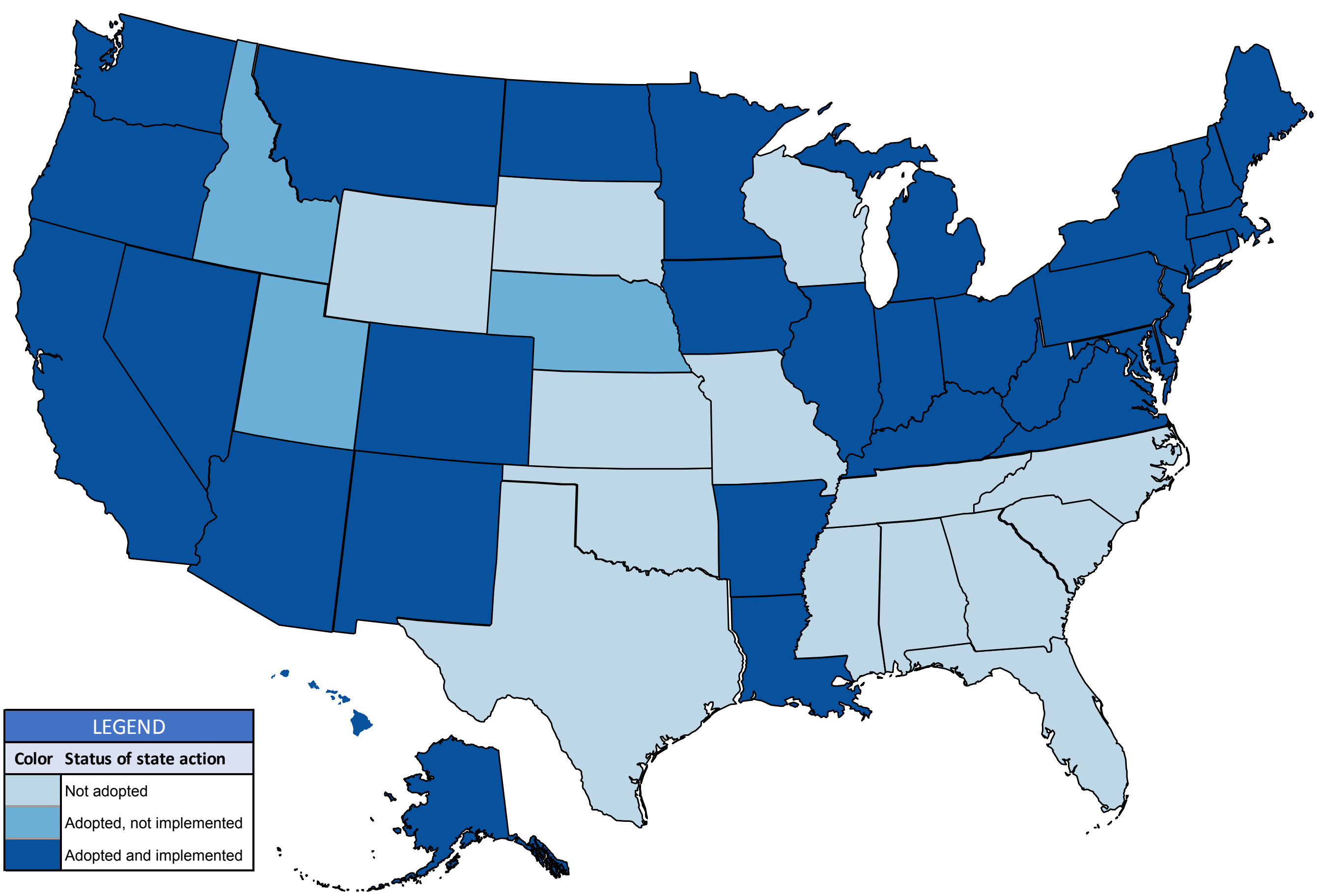
(from $106,800 in 2010 to $132,900 in 2019), the same 2pp tax could generate a greater improvement in disposable income. We estimate that a two-year reduction in the Social Security withholding rate of 2pp, along the lines of the 2011-12 cut, would boost aggregate household disposable income nearly $150bn dollars per year. This could plausibly boost the level of real GDP as much as 0.4-0.6%, at least temporarily, with much of the effect front-loaded in the first year.

Further Medicaid expansion under the ACA?

The outbreak of COVID-19 may bring renewed focus to the provision of health care services and, in particular, whether enough households have access to health insurance. In our view, the situation could create renewed momentum for adoption of the Medicaid expansion under the Patient Protection and Affordable Care Act (ACA, or the Act). The Medicaid expansion was a key provision of the Act and was designed to expand healthcare insurance to those with annual incomes below 138% of the federal poverty level, or $26,347 for a family of three and $15,417 for an individual. The Medicaid expansion was a key factor in reducing the uninsured rate, improving access to care, and reducing uncompensated care costs for hospitals and clinics.[5]

FIGURE 7

Status of State Medicaid expansion decisions: Status as of December 31, 2019



Source: Kaiser Family Foundation, "Status of State Medicaid expansion decisions," January 10, 2020, Barclays Research

[5] "The Effects of Medicaid Expansion under the ACA: Updated Findings from a Literature Review," Kaiser Family Foundation, 15 August 2019.

While the ACA mandated that health insurance exchanges be set up for every state, the ruling by the Supreme Court that the Medicaid expansion was optional led to uneven adoption of the legislation. By the end of 2019, 34 states plus the District of Columbia had adopted and implemented the Medicaid expansion. Two others – Idaho and Utah – recently adopted the Medicaid expansion, and implementation became effective January 1, 2020, and a third, Nebraska, adopted the Medicaid expansion, but had not implemented the expansion as of January 1, 2020. The remaining 14 states have not adopted the expansion. A widespread outbreak could create strong links between the uninsured, testing for COVID-19, and any desire to direct public funds to deal with treatment. One relatively straightforward way to address these concerns would be through further expansion of Medicaid in the states that have not yet signed onto all the provisions of the ACA.

Analyst Certification
We, Joseph Abate, Michael Gapen and Shawn Golhar, hereby certify (1) that the views expressed in this research report accurately reflect our personal views about any or all of the subject securities or issuers referred to in this research report and (2) no part of our compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this research report.

Important Disclosures:
Barclays Research is produced by the Investment Bank of Barclays Bank PLC and its affiliates (collectively and each individually, "Barclays").
All authors contributing to this research report are Research Analysts unless otherwise indicated. The publication date at the top of the report reflects the local time where the report was produced and may differ from the release date provided in GMT.

Availability of Disclosures:
For current important disclosures regarding any issuers which are the subject of this research report please refer to https://publicresearch.barclays.com or alternatively send a written request to: Barclays Research Compliance, 745 Seventh Avenue, 13th Floor, New York, NY 10019 or call +1-212-526-1072.

Barclays Capital Inc. and/or one of its affiliates does and seeks to do business with companies covered in its research reports. As a result, investors should be aware that Barclays may have a conflict of interest that could affect the objectivity of this report. Barclays Capital Inc. and/or one of its affiliates regularly trades, generally deals as principal and generally provides liquidity (as market maker or otherwise) in the debt securities that are the subject of this research report (and related derivatives thereof). Barclays trading desks may have either a long and / or short position in such securities, other financial instruments and / or derivatives, which may pose a conflict with the interests of investing customers. Where permitted and subject to appropriate information barrier restrictions, Barclays fixed income research analysts regularly interact with its trading desk personnel regarding current market conditions and prices. Barclays fixed income research analysts receive compensation based on various factors including, but not limited to, the quality of their work, the overall performance of the firm (including the profitability of the Investment Banking Department), the profitability and revenues of the Markets business and the potential interest of the firm's investing clients in research with respect to the asset class covered by the analyst. To the extent that any historical pricing information was obtained from Barclays trading desks, the firm makes no representation that it is accurate or complete. All levels, prices and spreads are historical and do not necessarily represent current market levels, prices or spreads, some or all of which may have changed since the publication of this document. Barclays Research Department produces various types of research including, but not limited to, fundamental analysis, equity-linked analysis, quantitative analysis, and trade ideas. Recommendations and trade ideas contained in one type of Barclays Research may differ from those contained in other types of Barclays Research, whether as a result of differing time horizons, methodologies, or otherwise.
In order to access Barclays Statement regarding Research Dissemination Policies and Procedures, please refer to *https://publicresearch.barcap.com/S/RD.htm*. In order to access Barclays Research Conflict Management Policy Statement, please refer to: *https://publicresearch.barcap.com/S/CM.htm*.

All pricing information is indicative only. Unless otherwise indicated, prices are sourced from Refinitiv and reflect the closing price in the relevant trading market, which may not be the last available price at the time of publication.

Types of investment recommendations produced by Barclays FICC Research:
In addition to any ratings assigned under Barclays' formal rating systems, this publication may contain investment recommendations in the form of trade ideas, thematic screens, scorecards or portfolio recommendations that have been produced by analysts in FICC Research. Any such investment recommendations produced by non-Credit Research teams shall remain open until they are subsequently amended, rebalanced or closed in a future research report. Any such investment recommendations produced by the Credit Research teams are valid at current market conditions and may not be otherwise relied upon.

Disclosure of other investment recommendations produced by Barclays FICC Research:
Barclays FICC Research may have published other investment recommendations in respect of the same securities/instruments recommended in this research report during the preceding 12 months. To view all investment recommendations published by Barclays FICC Research in the preceding 12 months please refer to *https://live.barcap.com/go/research/Recommendations*.

Legal entities involved in producing Barclays Research:
Barclays Bank PLC (Barclays, UK)
Barclays Capital Inc. (BCI, US)
Barclays Bank Ireland PLC, Frankfurt Branch (BBI, Frankfurt)
Barclays Bank Ireland PLC, Paris Branch (BBI, Paris)
Barclays Bank Ireland PLC, Milan Branch (BBI, Milan)
Barclays Securities Japan Limited (BSJL, Japan)
Barclays Bank PLC, Hong Kong branch (Barclays Bank, Hong Kong)
Barclays Capital Canada Inc. (BCCI, Canada)
Barclays Bank Mexico, S.A. (BBMX, Mexico)
Barclays Securities (India) Private Limited (BSIPL, India)
Barclays Bank PLC, India branch (Barclays Bank, India)
Barclays Bank PLC, Singapore branch (Barclays Bank, Singapore)
Barclays Bank PLC, DIFC Branch (Barclays Bank, DIFC)

Disclaimer:
This publication has been produced by Barclays Research Department in the Investment Bank of Barclays Bank PLC and/or one or more of its affiliates (collectively and each individually, "Barclays"). It has been prepared for institutional investors and not for retail investors. It has been distributed by one

or more Barclays affiliated legal entities listed below. It is provided to our clients for information purposes only, and Barclays makes no express or implied warranties, and expressly disclaims all warranties of merchantability or fitness for a particular purpose or use with respect to any data included in this publication. To the extent that this publication states on the front page that it is intended for institutional investors and is not subject to all of the independence and disclosure standards applicable to debt research reports prepared for retail investors under U.S. FINRA Rule 2242, it is an "institutional debt research report" and distribution to retail investors is strictly prohibited. Barclays also distributes such institutional debt research reports to various issuers, media, regulatory and academic organisations for their own internal informational news gathering, regulatory or academic purposes and not for the purpose of making investment decisions regarding any debt securities. Media organisations are prohibited from re-publishing any opinion or recommendation concerning a debt issuer or debt security contained in any Barclays institutional debt research report. Any such recipients that do not want to continue receiving Barclays institutional debt research reports should contact debtresearch@barclays.com. Clients that are subscribed to receive equity research reports, will not receive certain cross asset research reports co-authored by equity and FICC research analysts that are distributed as "institutional debt research reports" unless they have agreed to accept such reports. Eligible clients may get access to such cross asset reports by contacting debtresearch@barclays.com. Barclays will not treat unauthorized recipients of this report as its clients and accepts no liability for use by them of the contents which may not be suitable for their personal use. Prices shown are indicative and Barclays is not offering to buy or sell or soliciting offers to buy or sell any financial instrument.

Without limiting any of the foregoing and to the extent permitted by law, in no event shall Barclays, nor any affiliate, nor any of their respective officers, directors, partners, or employees have any liability for (a) any special, punitive, indirect, or consequential damages; or (b) any lost profits, lost revenue, loss of anticipated savings or loss of opportunity or other financial loss, even if notified of the possibility of such damages, arising from any use of this publication or its contents.

Other than disclosures relating to Barclays, the information contained in this publication has been obtained from sources that Barclays Research believes to be reliable, but Barclays does not represent or warrant that it is accurate or complete. Barclays is not responsible for, and makes no warranties whatsoever as to, the information or opinions contained in any written, electronic, audio or video presentations of third parties that are accessible via a direct hyperlink in this publication or via a hyperlink to a third-party web site ('Third-Party Content'). Any such Third-Party Content has not been adopted or endorsed by Barclays, does not represent the views or opinions of Barclays, and is not incorporated by reference into this publication. Third-Party Content is provided for information purposes only and Barclays has not independently verified its accuracy or completeness.

The views in this publication are solely and exclusively those of the authoring analyst(s) and are subject to change, and Barclays Research has no obligation to update its opinions or the information in this publication. Unless otherwise disclosed herein, the analysts who authored this report have not received any compensation from the subject companies in the past 12 months. If this publication contains recommendations, they are general recommendations that were prepared independently of any other interests, including those of Barclays and/or its affiliates, and/or the subject companies. This publication does not contain personal investment recommendations or investment advice or take into account the individual financial circumstances or investment objectives of the clients who receive it. The securities and other investments discussed herein may not be suitable for all investors. Barclays is not a fiduciary to any recipient of this publication. Investors must independently evaluate the merits and risks of the investments discussed herein, consult any independent advisors they believe necessary, and exercise independent judgment with regard to any investment decision. The value of and income from any investment may fluctuate from day to day as a result of changes in relevant economic markets (including changes in market liquidity). The information herein is not intended to predict actual results, which may differ substantially from those reflected. Past performance is not necessarily indicative of future results. The information provided does not constitute a financial benchmark and should not be used as a submission or contribution of input data for the purposes of determining a financial benchmark.

United Kingdom: This document is being distributed (1) only by or with the approval of an authorised person (Barclays Bank PLC) or (2) to, and is directed at (a) persons in the United Kingdom having professional experience in matters relating to investments and who fall within the definition of "investment professionals" in Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 (the "Order"); or (b) high net worth companies, unincorporated associations and partnerships and trustees of high value trusts as described in Article 49(2) of the Order; or (c) other persons to whom it may otherwise lawfully be communicated (all such persons being "Relevant Persons"). Any investment or investment activity to which this communication relates is only available to and will only be engaged in with Relevant Persons. Any other persons who receive this communication should not rely on or act upon it. Barclays Bank PLC is authorised by the Prudential Regulation Authority and regulated by the Financial Conduct Authority and the Prudential Regulation Authority and is a member of the London Stock Exchange.

European Economic Area ("EEA"): This material is being distributed in the EEA by Barclays Bank PLC. Barclays Bank PLC is not registered in France with the Autorité des marchés financiers or the Autorité de contrôle prudentiel.

Americas: The Investment Bank of Barclays Bank PLC undertakes U.S. securities business in the name of its wholly owned subsidiary Barclays Capital Inc., a FINRA and SIPC member. Barclays Capital Inc., a U.S. registered broker/dealer, is distributing this material in the United States and, in connection therewith accepts responsibility for its contents. Any U.S. person wishing to effect a transaction in any security discussed herein should do so only by contacting a representative of Barclays Capital Inc. in the U.S. at 745 Seventh Avenue, New York, New York 10019.

Non-U.S. persons should contact and execute transactions through a Barclays Bank PLC branch or affiliate in their home jurisdiction unless local regulations permit otherwise.

This material is distributed in Canada by Barclays Capital Canada Inc., a registered investment dealer, a Dealer Member of IIROC (www.iiroc.ca), and a Member of the Canadian Investor Protection Fund (CIPF).

This material is distributed in Mexico by Barclays Bank Mexico, S.A. This material is distributed in the Cayman Islands and in the Bahamas by Barclays Capital Inc., which it is not licensed or registered to conduct and does not conduct business in, from or within those jurisdictions and has not filed this material with any regulatory body in those jurisdictions.

Japan: This material is being distributed to institutional investors in Japan by Barclays Securities Japan Limited. Barclays Securities Japan Limited is a joint-stock company incorporated in Japan with registered office of 6-10-1 Roppongi, Minato-ku, Tokyo 106-6131, Japan. It is a subsidiary of Barclays Bank PLC and a registered financial instruments firm regulated by the Financial Services Agency of Japan. Registered Number: Kanto Zaimukyokucho (kinsho) No. 143.

Asia Pacific (excluding Japan): Barclays Bank PLC, Hong Kong Branch is distributing this material in Hong Kong as an authorised institution regulated by the Hong Kong Monetary Authority. Registered Office: 41/F, Cheung Kong Center, 2 Queen's Road Central, Hong Kong.

All Indian securities-related research and other equity research produced by Barclays' Investment Bank are distributed in India by Barclays Securities (India) Private Limited (BSIPL). BSIPL is a company incorporated under the Companies Act, 1956 having CIN U67120MH2006PTC161063. BSIPL is registered and regulated by the Securities and Exchange Board of India (SEBI) as a Research Analyst: INH000001519; Portfolio Manager INP000002585;

Stock Broker/Trading and Clearing Member: National Stock Exchange of India Limited (NSE) Capital Market INB231292732, NSE Futures & Options INF231292732, NSE Currency derivatives INE231450334, Bombay Stock Exchange Limited (BSE) Capital Market INB011292738, BSE Futures & Options INF011292738; Depository Participant (DP) with the National Securities & Depositories Limited (NSDL): DP ID: IN-DP-NSDL-299-2008; Investment Adviser: INA000000391. The registered office of BSIPL is at 208, Ceejay House, Shivsagar Estate, Dr. A. Besant Road, Worli, Mumbai – 400 018, India. Telephone No: +91 2267196000. Fax number: +91 22 67196100. Any other reports produced by Barclays' Investment Bank are distributed in India by Barclays Bank PLC, India Branch, an associate of BSIPL in India that is registered with Reserve Bank of India (RBI) as a Banking Company under the provisions of The Banking Regulation Act, 1949 (Regn No BOM43) and registered with SEBI as Merchant Banker (Regn No INM000002129) and also as Banker to the Issue (Regn No INBI00000950). Barclays Investments and Loans (India) Limited, registered with RBI as Non Banking Financial Company (Regn No RBI CoR-07-00258), and Barclays Wealth Trustees (India) Private Limited, registered with Registrar of Companies (CIN U93000MH2008PTC188438), are associates of BSIPL in India that are not authorised to distribute any reports produced by Barclays' Investment Bank.

This material is distributed in Singapore by the Singapore branch of Barclays Bank PLC, a bank licensed in Singapore by the Monetary Authority of Singapore. For matters in connection with this material, recipients in Singapore may contact the Singapore branch of Barclays Bank PLC, whose registered address is 10 Marina Boulevard, #23-01 Marina Bay Financial Centre Tower 2, Singapore 018983.

This material is distributed to persons in Australia by Barclays Bank PLC. None of Barclays Bank PLC, nor any other Barclays group entity, holds an Australian financial services licence and instead relies on an exemption from the requirement to hold such a licence. This material is intended to only be distributed to "wholesale clients" as defined by the Australian Corporations Act 2001. This material is distributed in New Zealand by Barclays Bank PLC, but it has not been registered, filed or approved by any New Zealand regulatory authority or under or in accordance with the Financial Markets Conduct Act of 2013, and this material is not a disclosure document under New Zealand law.

Middle East: Nothing herein should be considered investment advice as defined in the Israeli Regulation of Investment Advisory, Investment Marketing and Portfolio Management Law, 1995 ("Advisory Law"). This document is being made to eligible clients (as defined under the Advisory Law) only. Barclays Israeli branch previously held an investment marketing license with the Israel Securities Authority but it cancelled such license on 30/11/2014 as it solely provides its services to eligible clients pursuant to available exemptions under the Advisory Law, therefore a license with the Israel Securities Authority is not required. Accordingly, Barclays does not maintain an insurance coverage pursuant to the Advisory Law.

This material is distributed in the United Arab Emirates (including the Dubai International Financial Centre) and Qatar by Barclays Bank PLC. Barclays Bank PLC in the Dubai International Financial Centre (Registered No. 0060) is regulated by the Dubai Financial Services Authority (DFSA). Principal place of business in the Dubai International Financial Centre: The Gate Village, Building 4, Level 4, PO Box 506504, Dubai, United Arab Emirates. Barclays Bank PLC-DIFC Branch, may only undertake the financial services activities that fall within the scope of its existing DFSA licence. Related financial products or services are only available to Professional Clients, as defined by the Dubai Financial Services Authority. Barclays Bank PLC in the UAE is regulated by the Central Bank of the UAE and is licensed to conduct business activities as a branch of a commercial bank incorporated outside the UAE in Dubai (Licence No.: 13/1844/2008, Registered Office: Building No. 6, Burj Dubai Business Hub, Sheikh Zayed Road, Dubai City) and Abu Dhabi (Licence No.: 13/952/2008, Registered Office: Al Jazira Towers, Hamdan Street, PO Box 2734, Abu Dhabi). This material does not constitute or form part of any offer to issue or sell, or any solicitation of any offer to subscribe for or purchase, any securities or investment products in the UAE (including the Dubai International Financial Centre) and accordingly should not be construed as such. Furthermore, this information is being made available on the basis that the recipient acknowledges and understands that the entities and securities to which it may relate have not been approved, licensed by or registered with the UAE Central Bank, the Dubai Financial Services Authority or any other relevant licensing authority or governmental agency in the UAE. The content of this report has not been approved by or filed with the UAE Central Bank or Dubai Financial Services Authority. Barclays Bank PLC in the Qatar Financial Centre (Registered No. 00018) is authorised by the Qatar Financial Centre Regulatory Authority (QFCRA). Barclays Bank PLC-QFC Branch may only undertake the regulated activities that fall within the scope of its existing QFCRA licence. Principal place of business in Qatar: Qatar Financial Centre, Office 1002, 10th Floor, QFC Tower, Diplomatic Area, West Bay, PO Box 15891, Doha, Qatar. Related financial products or services are only available to Business Customers as defined by the Qatar Financial Centre Regulatory Authority.

Russia: This material is not intended for investors who are not Qualified Investors according to the laws of the Russian Federation as it might contain information about or description of the features of financial instruments not admitted for public offering and/or circulation in the Russian Federation and thus not eligible for non-Qualified Investors. If you are not a Qualified Investor according to the laws of the Russian Federation, please dispose of any copy of this material in your possession.

IRS Circular 230 Prepared Materials Disclaimer: Barclays does not provide tax advice and nothing contained herein should be construed to be tax advice. Please be advised that any discussion of U.S. tax matters contained herein (including any attachments) (i) is not intended or written to be used, and cannot be used, by you for the purpose of avoiding U.S. tax-related penalties; and (ii) was written to support the promotion or marketing of the transactions or other matters addressed herein. Accordingly, you should seek advice based on your particular circumstances from an independent tax advisor.