Summary

- The COVID-19 crisis has, as expected, seen moves towards Modern Monetary Theory (MMT) to deal with soaring public deficits and debt
- MMT states that governments only face inflation limits to money printing: while inflation is low for now, it won't stay that way forever
- Only eight countries in the world meet our proposed MMT criteria: leaving aside the US, these countries need the rare combination of sovereign currency, simultaneous fiscal deficit and current account surplus, plus good governance
- As such, MMT may be a very strong medicine but, in almost all instances the cure is likely worse than the disease – a fact that will increase geopolitical stresses ahead
- Looking at the specific example of India, we show that a major MMT fiscal package could push inflation up to 12% and the currency down by 25%

Not so Modern; not so Monetary; not so Theory

In April 2019 we published a special report examining Modern Monetary Theory (MMT) which we noted was then “being discussed -- and dismissed-- in high policy circles”.

Just over a year later, and the COVID-19 crisis has brought a collapse in GDP and a whole list of economic issues: questions over the strength of future growth; equally staggering increases in public deficits and debt; ultra-easy monetary policy almost everywhere; central-bank balance sheets rising far faster than during 2008-09; the adoption of yield curve control by conservative central banks such as the Reserve Bank of Australia; partial monetization of the fiscal deficit by the Bank of England; Quantitative Easing (QE) in emerging markets such as Colombia, Poland, and Romania; and even planned outright partial monetization of fiscal deficits by Indonesia - while India is actively thinking about it too. US economist and Democratic Party advisor Stephanie Kelton’s book "The Deficit Myth", which advocates MMT, is also a best-seller.

**Would MMT be good for the economy?** In this report we attempt to show that it could be the only course of medicine available to economies badly weakened by the impacts of the corona virus. However, we also want to stress that MMT is a medicine that will likely hurt more patients than it cures. Very few economies can hope to take it on a sustainable basis.

Without wishing to repeat what we wrote in 2019, let’s reiterate a few key points here:

- **MMT is not modern.** Monetization of the fiscal deficit via coin debasement goes all the way back to the ancient Greeks and the Bible, which are replete with references to it.
- **MMT is not just monetary.** It involves money creation, but it is about power (recall the old adage 'money is power').
- **MMT is not a theory.** We have many historical examples. The Romans’ denarius declined from nearly pure silver to 2%; the Indian Vijayanagara Empire under Harihara I and Bukka Raya debased its gold coinage; the practice continued throughout European kingdoms - the Great Debasement of Henry VIII, for example; and on pure money-printing, look at Hungary in 1946 – the examples are so numerous that to use the word ‘theory’ seems ridiculous.
MMTroika

Fundamentally, MMT argues the following three things:

1. Sovereign currency-issuing governments are financially unconstrained;
2. Taxes are not needed to finance government spending; and
3. The role of taxes is to drain money out of the economy after the government has spent it, in order to manage aggregate demand and keep it in line with the available supply of resources.

In short, MMT says that a government can finance any budget deficit by de facto monetization and hence have no monetary limits. As we underlined in 2019 (and as we have since witnessed in the face of COVID-19 and rising geopolitical tensions), when a genuine national emergency arises, the government spends first, the central bank helps, and questions are asked later. MMT merely points out we don’t have to wait for a killer virus or the risk of war to act in this manner.

Of course, this is not the end of the argument. MMT advocates that there are real-world limitations on what any government can do. The government of a country can always spend a vast amount of printed money – and it can create huge inflation as a result. Indeed, turning on the taps after turning them off is the hard part – which is why nobody has done it in the recent past. Because of this fear, there are political limits to what a government can do: deficit spending past a certain level is prohibited in certain countries, no matter how it is financed. The government voluntarily accepts such limits on its power, or other pressure groups force it to. The Eurozone is obviously a key example of this self-imposed fiscal limitation.

Moreover, the government of a country with no natural resources, no industrial muscle, and no human capital cannot just print money to generate prosperity, even if there is local consensus. It has the power domestically to do that if it chooses, but it does not have the power internationally to force other countries to accept the newly-minted money, backed by no real economic value, in exchange for the goods and services, machinery and talent that it requires for development. The results are, again, usually inflation and huge economic problems, not solutions.

Indeed, consider the A–Z of states that have tried MMT - and the results: Argentina – and hyper-inflation; Brazil – and hyper-inflation; Weimar Germany – and hyper-inflation (a case study most contemporary economists are aware of); and Zimbabwe – and hyper-inflation.

How does MMT work?

MMT seems to generate some consternation among economists, and indeed people in general. They seem unable to grasp that governments, unlike households or businesses, are not balance-sheet constrained. They can just print money; there is a magic money tree (which has the initials MMT, of course!). Indeed, the mechanism by which MMT works is very simple (Figure 1). The government spends money into the economy – which in a sovereign-currency issuer comes before taxation. If there is not enough tax to cover the required spending (either because the economy is weak or because the government does not want to tax too much), then bonds are issued to make up the difference. This is the same as in normal economic ‘theory’.

All that then changes is that the central bank either buys the bonds directly from the government (which is debt monetization), or if private banks buy the bonds it buys them from that secondary market. The latter is what we already see in QE - unless one believes that central banks will start running down their balance sheets again. Once the government has spent the money, the normal ‘money-multiplier’ effect works. Of course, in an economy that requires the government to take a
radical step like embracing MMT, the likelihood is that banks will not be willing to lend freely. In which case, the argument is for more MMT, not less.

Figure 1: It’s neither voodoo nor rocket science

<table>
<thead>
<tr>
<th>Government raises funds through taxes and issuing bonds. Central bank buys the bonds on the primary market.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government deposits money at a bank.</td>
</tr>
<tr>
<td>Bank holds 10 in reserve and lends 90 to firms and households.</td>
</tr>
<tr>
<td>Firms and households deposit money at a different bank. This bank also holds money in reserve and lends out the remainder. This process repeats.</td>
</tr>
</tbody>
</table>

Source: RaboResearch

Power to the people!

So there are several issues of power: does the government have the power to overcome objections from other stakeholders in the economy to print money? Does it have the power to control its own worst instincts once it does start to print that money, and keep inflation in check? Moreover, does it then have the power to persuade other countries that its currency remains of value while it is doing so?

To underline these multiple ‘power points’, it is important to understand that every country has three key surpluses/deficits accounting identities that interact in this regard:

- There is the fiscal/public-sector balance which is, of course, central to the MMT argument. MMT requires that a country runs a large fiscal deficit, which the central bank finances;
- There is the private-sector balance, which represents the sum of the household balance (saving/dis-saving) and the business sector balance (saving/dis-saving); and
- There is the current-account/external balance, which is always the sum of the public and the private-sector balances. For example, if the fiscal balance is -5% of GDP and the private-sector balance is -4% (households and businesses both -2%) then the country’s external balance with the rest of the world must be -9% of GDP (-5% and -4%).

This is of crucial importance to MMT because **in order to have the power to create money domestically AND to have it accepted on a stable basis internationally, a government needs to maintain a current-account surplus** (Figure 2).

That does not mean that everything goes wrong immediately after a country embraces central-bank deficit financing. There is always a lag, similar to an eventual inflationary impact of a demand shift when supply is fixed. However, serious problems will still emerge over time, as we will discuss shortly.
Current account deficit countries

If you try MMT with a current-account deficit, in most cases it will not end well. After all, what you are seeing is government spending - with printed money - to such an extent that the overall economy is dis-saving (Figure 3): the fiscal balance (in our example -5%) does not see an off-setting private sector surplus, but a deficit of -4%, meaning that the country is running a large external deficit.

Perhaps inflation will already be too high in this case, as demand is clearly running ahead of supply, which will undermine the exchange rate. Yet even if inflation stays low, when the private sector is borrowing from the rest of the world (4% of GDP here) it is doing so with an excess supply of local currency due to money printing. The exchange rate will again depreciate – and in time lead to imported inflation if nothing else. In traditional economic theory, at this point interest rates should rise to compensate: but under MMT, interest rates are artificially depressed by central-bank bond buying so only the FX rate moves.

Again, this part is not theory but is already happening, whether you buy into the idea of MMT or not.

Current-account surplus countries

If a country runs a large fiscal deficit (~12% of GDP, for example), but runs huge household and business surpluses (for example, a private sector surplus of 14% of GDP in total), then internationally the country is a net lender not a borrower. So it can keep control of both (low) interest rates—as long as it faces no inflation problems domestically—and the exchange rate...
(Figure 4). Add capital controls to the above example and you are describing the situation in China: again, this is not theory, it is observed in reality.

**Figure 4: Current account surplus: no problem**

Money, money, money

For proof of just how vulnerable some currencies can be to shifts in market sentiment even before they embrace MMT, look at the range which some major emerging and developed market traded over the first half of 2020 (Figure 5).

**Figure 5: The shape of things to come...and it is not 'V'**

The orange columns show the start of H1 2020 as 100 and the close of H1 at the bottom, where we see declines of over 25%. The black line shows the H1 high and low. Note IDR saw a sharp sell-off before a recovery; and even the AUD, little changed between the 1 January and 30 June dates, recorded a collapse on the scale of an emerging market like Argentina – albeit one that was reversed. Not all currencies are going to show such V-shapes if they embrace MMT in the future.

So when will MMT work?

So how can we define when MMT will and won’t work? We have tried to make a simple universal framework to define who can and who can’t, should and shouldn’t do so.

- First, we need to rule out countries that do not have their own sovereign currency or who use a peg. This is still a surprisingly large number - and includes the Eurozone.
• Second, we then need to apply two datasets: the fiscal and current-account deficits as a percentage of GDP over time, comparing 2000 and 2018.¹
• Third, having the policy discipline to turn off the fiscal taps if inflation is too high is a tough hurdle. Therefore, we also add a filter for the World Bank’s measure of institutional quality², with the metric that the country must be above the median for this global measure.

In short, we ask: **which economies consistently run a fiscal deficit and a current account surplus and are well-governed?** Based on those criteria, we divide nations into four different categories.

**“Go for it!”**

Our main conclusion is this: **few countries are strong enough for the MMT treatment.** Only seven in fact: Japan, Malaysia, China, Thailand, Uruguay, Israel, and Botswana (shown as the green countries in Figure 6 below). The Eurozone also could - but as noted it chooses not to. The US could also adopt MMT, but it is a special case, as we will discuss shortly. Even though these seven countries all meet our criteria, they still may not present as obvious candidates for MMT in terms of overall institutional quality given the heavy burdens involved. One could also question whether they can sustain a current account surplus if their fiscal deficits widen too far, too fast.

Even assuming that these candidates are all viable, what does this show us? China, Japan, and the US collectively constitute 38% of world GDP, all of the other listed economies are relatively small. Asia is well represented, Africa has only one candidate, as does Latin America, and Europe has none, albeit this is a self-imposed political choice in the former case. Overall, our analysis does not suggest that the world can rely on MMT, despite the current hype about it.

**Figure 6: Not so very easy does it, eh?**

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1 We have based our analysis on the fiscal deficit of the central government. As a robustness check we have done the same analysis using the fiscal balance of the general government. The overall results remain the same, with the exception that Denmark would also end up being in the ‘Go for it!’ bucket.

2 We have based institutional quality on the World Bank’s government effectiveness index. This index captures the independence of the public services from political pressures and the quality of policy formulation.
Table 1: Only a small number of countries should consider taking the MMT medicine

<table>
<thead>
<tr>
<th></th>
<th>Fiscal balance</th>
<th>Current account balance</th>
<th>Fiscal balance</th>
<th>Current account balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>-6.1</td>
<td>2.7</td>
<td>-3.2</td>
<td>3.5</td>
</tr>
<tr>
<td>Malaysia</td>
<td>-4.1</td>
<td>9.0</td>
<td>-3.6</td>
<td>2.1</td>
</tr>
<tr>
<td>China</td>
<td>-7.8</td>
<td>1.7</td>
<td>-11.2*</td>
<td>0.4</td>
</tr>
<tr>
<td>Thailand</td>
<td>-1.8</td>
<td>7.4</td>
<td>-0.5</td>
<td>5.6</td>
</tr>
<tr>
<td>Namibia</td>
<td>-1.4</td>
<td>5.0</td>
<td>-2.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Uruguay</td>
<td>-3.5</td>
<td>2.5</td>
<td>-2.4</td>
<td>1.9</td>
</tr>
</tbody>
</table>

*This is the IMF estimate of the total government budget deficit, more relevant here
Sources: RaboResearch, World Bank, IMF

“Watch out”

Countries that run twin surpluses (orange in Figure 6), which are relatively few in number, pose an interesting question: could they handle MMT? In some cases, a fiscal deficit might lead to a private sector deficit and so a current-account deficit: in others it might not. We take a conservative view and say they should not – but this is subjective and may perhaps overlook a few more viable MMT candidates.

“Don’t even try”

Naturally, there are many more countries who should never try MMT: those are the ones who run both a fiscal and current-account deficit already, which would mean that they start from the worst possible position. Debt monetization from this position surely spells trouble. Likewise, one must be sceptical of countries who run a fiscal surplus and a current account deficit as they would be in the same position as soon as the government started spending under MMT. The countries that should not resort to MMT are marked red in Figure 6. This bucket encompasses many key emerging markets, such as India, South Africa, Indonesia, the Philippines, and Poland.

Large economies like the UK and Australia are also put in the ‘don’t even try bucket’, although the UK is already pursuing (very) partial MMT as we speak, and is expanding its fiscal deficit ever further: and Australia has adopted a ‘yield curve control policy’ alongside the central-bank pledge of unlimited bond buying in its support (which has not been needed so far). Time will tell whether this is an accurate assessment, but history is arguably not on the side of those with twin fiscal and current-account deficits; that holds true even if the initial support to bond prices under MMT and a global reach for yield are keeping markets sanguine for the time being, as is happening in some EMs too.

Indeed, the sharp post-Brexit decline in the GBP and the fall in the AUD during the peak of the COVID-19 market panic in March 2020 both suggest there will be no natural long-term bid for these currencies if they run huge twin deficits. And imagine what the outlook would be for Indonesia or India if they tried to sustain MMT for more than a brief period.
So very few?

A key point to stress is that all the countries flagged as MMT candidates are net exporters: but we can’t all be net exporters! Crucially, however, all countries can try to shift their economic structure in that direction, thus allowing them to take MMT treatment if they so choose. To do so they would need to adopt policies to ensure that even when the government runs a large deficit, the private sector would run a larger surplus: that means they would produce more than they consume, and consequently run an external surplus (and join the ‘Go for it!’ bucket).

So how can this be done? Here’s a few examples: boost infrastructure investment with local input requirements; boost R&D to move up the value-chain; use tariffs to cement supply chains to increase industrial muscle and boost domestic corporate profitability; raise household incomes while encouraging domestic consumption; and capital controls to keep MMT funds ring-fenced.

Does this sound familiar? It should: it’s the China playbook: one others will copy in a post-COVID-19 world where all are struggling to find new growth drivers and the state is playing a far larger role. The question is: can the world handle more Chinas?

In short, large-scale MMT without a global buyer of last resort means a reflationary but zero-sum game. Put another way, MMT solves domestic problems while creating them internationally. But doesn’t even the very best medicine have side-effects?

The Odd Decouple: the US (and China)

The US is the odd one out in the ‘Go for it!’ bucket. The main reason is that the USD is the global reserve currency. Global demand for US dollars and assets to keep them in must be met by the US running structural twin deficits; in turn, those twin deficits drive demand for dollars. In fact, vast as the expansion in the Fed’s balance sheet has been of late, if one compares it with the Bank of Japan (Figure 7), there is no reason why the Fed cannot double or even triple its assets as a percentage of US GDP (from around 30% now): that covers years of huge fiscal deficits ahead.

Even so, the fact that the US can take the MMT medicine too ignores two key points.

First, if the US needs to run such massive fiscal deficits, it is an admission of economic failure in a country that prides itself on small government and free enterprise. Is the US able to think in terms of a vastly larger, productive state role?

Using MMT presents an enormous opportunity: in this report we showed just how much US productivity could be raised if the government adopted policies focused on raising R&D investment and human capital. Yet the Trump administration appears to have no vision for what a massive fiscal deficit might be spent on, apart from tax cuts. And although Kelton’s MMT vision speaks of new infrastructure and a Green New Deal, and the Biden campaign has promised a new USD2 trillion fiscal package, it has also stated that it will adopt a more gradualist approach.
A reliance on consumption-based MMT is unlikely to be good for the US (see Figure 8). The Triffin Dilemma states that reserve currency systems break down due to their own success exacting too high an economic toll on the provider of that currency, who has to run large external deficits to fill world demand. If the US used MMT for consumption or—circuitously—share buy-backs, and not for productive investment, this would help other MMT-users, like China, but wouldn’t help US output, productivity, or socio-economic equality – an issue now very much in focus. Both Biden and Trump want to make more things in America, not to buy more products from others.

Second, past an unknown critical threshold, MMT could see the collapse of USD currency hegemony as people lose faith in it. All systems can only be pushed so far, and there is chatter that the US risks doing just that. Does the world still want a USD-centric system if USD are openly printed to fund the state spending that drives the external deficit? Given the Fed’s balance sheet expansion, one could argue this is already de facto the case – and to no ill effect given there’s no alternative to the USD. This is most likely to remain the case until the US wants to walk away from global reserve status. However, it overlooks the fact that the US is engaged in a geopolitical struggle with China where the global role of the USD is a key factor. Which complicates matters hugely.

Indeed, to use consumption MMT sustainably the US would either have to:

- Build bridges with China, rather than in the US - and wait for the system to break down in the future; or
- Decouple from China and see more favored countries play the same role—again within a system that has a finite breaking point; or
- Become a net exporter like the other countries in the ‘Go for it!’ bucket by embracing Trumpian ‘America First’ policies.

Ironically, such a US shift would undermine MMT elsewhere by making it hard for others to run a current account surplus by selling to it! That’s an underlying dynamic we already see playing out between the US and China, and is why CNY has weakened and USD has strengthened during periods of geopolitical/trade tensions. Tensions which may be heading for praxis, a destabilising event that could force other countries to turn to MMT regardless of the risks involved.

**Figure 8: The US Treasury is hardly short of firepower thanks to the Fed**

![Graph](image-url)
Serious side-effects: the case of India

As already noted, history shows that irresponsible use of MMT can have serious side effects, not least of which inflation. Just think of the trillion Zimbabwean dollar notes. So what happens if the cure is worse than the disease domestically?\(^3\)

With these inflation and currency risks in mind and to illustrate why it is essential to consider the effects of MMT before actually implementing it, we have modelled the stepwise process for India, a country that, in our opinion, should not take the MMT medicine.

**India’s previous addiction to MMT meds**

Even as recently as the 1980s, India was a closed economy and financial markets were segmented and lacking sophistication. The economy was plagued by volatile and high inflation, which was caused primarily by excessive money supply due to the RBI’s credits to the government. Or as the BIS puts it: “monetary policy in India during this period was completely subservient to the fiscal stance of the central government.”

After numerous shifts in the monetary policy regime (see here), the Fiscal Responsibility and Budget Management Act (FRBM) now explicitly forbids the RBI from buying bonds on the primary market. However, there is an escape clause saying that a national calamity or a decline in real quarterly output by at least three percentage points below the average of the previous four quarters would allow debt monetization. So in theory, India could resort to MMT.

The discussion about debt monetization has been fueled by COVID-19 resulting in a bloated fiscal deficit of -6.9% (according to our calculation). And in the very short term, debt monetization would not have too many negative repercussions because of massive risk-off sentiment, a point which has been raised by former RBI governor Raghuram Rajan. Banks are still reluctant to lend, as they prefer to park excess liquidity at the central bank against the reverse repo of 3.35% instead of receiving a yield of approximately 6% on corporate lending or government bonds. So even if the RBI would start buying bonds on the primary market and this cash would be spend in the real economy, it would ultimately end up on deposits by banks, which would channel those excess funds again to the RBI.

**Relapse**

However, as we have discussed in this report, all of this involves a major medium-term risk, especially since the Indian economy does not meet the conditions for MMT. India runs a structural twin deficit (Figure 8) and once you start using the money printer and ‘taking the meds’ again, you can expect a relapse into addiction. To gauge how big the relapse could be, we ran a scenario analysis using a system of equations which we integrally solve (see the Appendices for the technical details).

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\(^3\) Even some emerging markets have witnessed very subdued inflation trajectories over the past two decades, we argue that inflation could rise again in this study.
Scenario results

We have drawn up a scenario to gauge the economic impact of another government stimulus package financed by printed INR, starting from 2020Q3 onward and spread out over multiple years.\(^4\) We assume a package similar in magnitude to the USD 270bn stimulus package announced in May this year, which is equal to 10% of GDP. The major difference is that we assume that this second package is fully financed by freshly printed rupees.

Such a spending boost would certainly have positive effects on the economy. In this report, we argued the local equivalent of a 20 lakh crore package could raise GDP growth by 1.8ppts in fiscal year 2020/21. We assume that a second package of this magnitude would result in cumulative economic growth of an additional 2ppts vis-à-vis the baseline over the coming years, and an increase of India’s structural growth capacity by 6ppts.

However, it comes as no surprise that there are some serious side effects, even though the fiscal impulse is short-lived. As a first side effect, our model simulation shows that inflation might spike to 12% on average in 2021, which is more than twice the inflation rate in the baseline (Figure 9). These are inflation figures we have not witnessed in India for over three decades.

As a second side effect, our simulation shows that the rupee will be crushed: INR would depreciate by 16% against the USD in 2021 compared to 2020 levels and almost 25% against 2019 levels. Investors seeing their yield being eroded by high inflation would shift their

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\(^4\) Please see the technical appendix for a detailed description of the scenario, model and included variables.
portfolios away from Indian assets. Consequently, the INR would plunge, which would raise inflation even more, as imports become more expensive.

**Figure 10: The Indian rupee would be crushed as investors pull out of Indian assets**

Fast-rising inflation in combination with a freefall of the currency does not bode well for economic performance of countries. Although we have not calculated the second-order impact on the economy, such as a price-wage-price spiral, we are certain that MMT will ultimately be more damaging to the Indian economy than any short-term prosperity it brings.

Or to put it differently: **for India, as for most other economies, the MMT cure is worse than the disease.**

**Conclusion**

MMT is not as modern as its name might suggest, and it is not theory. We have seen a few successful, and many unsuccessful, attempts at implementing it. This underlines our point that MMT is not for everyone and that it cannot be applied on a broad scale today. For those countries that decide to take the medicine anyway, the consequences are the risk of a collapsing currency and spiking inflation. Moreover, large-scale MMT without a global buyer of last resort means we enter a reflationary but zero-sum game.
Appendix A: Equations

A system of equations to measure the economic impact of money printing in India

To simulate how money printing can lead to unfavorable results in countries that do not meet the proper economic criteria, we have modelled the channels through which money printing works. We take India as an example. The economic mechanisms that are important here are: 1) the impact of the monetary base (M0) on the broad money supply (M3); 2) the impact of the growth of M3 on inflation; and 3) the impact of inflation on the Indian rupee (INR). We also estimate a fourth equation to test whether the central bank generally increases M0 in response to an increase of the fiscal and current account deficit. The four equations can be defined as follows:

\[ \Delta(M^*_t) = c + \alpha_1 \Delta \left( \frac{FD}{Y_t} \right) + \alpha_2 \Delta \left( \frac{CA}{Y_t} \right) + \alpha_3 D^*_t + \epsilon_t \]  
(1)

\[ \Delta(M^*_t) = c + \alpha_4 \Delta \left( \frac{M^*_t}{Y_t} \right) + \alpha_5 \Delta \left( \frac{M^*_t}{Y_{t-1}} \right) + \alpha_6 \left( \frac{C_t}{Y_t} - \frac{C_{t-1}}{Y_{t-1}} \right) + \alpha_7 \Delta(i_t) + \epsilon_t \]  
(2)

\[ \Delta(CPI_t) = c + \alpha_8 \left( \Delta \left( \frac{M^*_t}{Y_{t-1}} \right) \geq 12 \right) \cdot \Delta \left( \frac{M^*_t}{Y_{t-1}} \right) + \alpha_9 \left( \Delta \left( \frac{M^*_t}{Y_{t-1}} \right) < 12 \right) \cdot \Delta \left( \frac{M^*_t}{Y_{t-1}} \right) \]  
\[ + \alpha_{10} (\Delta Y_t - \Delta Y^*_t) + \alpha_{11} \Delta(\text{INR}_t) + \alpha_{12} \Delta(O_t) + \alpha_{13} \Delta(R_{t-2}) + \epsilon_t \]  
(3)

\[ \Delta(\text{INR}_t) = c + \alpha_{14} (Y_t - Y^*_t) + \alpha_{15} \Delta(CPI_{t-1}) + \alpha_{16} \Delta(\text{INR}_{t-1}) + \alpha_{17} \Delta \left( \frac{FD}{Y_{t-1}} \right) + \alpha_{18} \Delta \left( \frac{CA}{Y_{t-1}} \right) + \alpha_{19} D^*_{t-1} + \epsilon_t \]  
(4)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Data sources</th>
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<tr>
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<td>Fiscal deficit, INR</td>
<td>Indian Ministry of Finance</td>
</tr>
<tr>
<td>CA</td>
<td>Current account deficit</td>
<td>RBI, IMF</td>
</tr>
<tr>
<td>D*</td>
<td>Demonetization dummy (2017 = 1, other years = 0)</td>
<td>-</td>
</tr>
<tr>
<td>CPI</td>
<td>Consumer Price Index</td>
<td>Indian Ministry of Statistics &amp; Programme Implementation (MoS&amp;Pi)</td>
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<td>M0</td>
<td>Monetary base, back casting using M1, INR</td>
<td>Reserve Bank of India (RBI), OECD</td>
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<tr>
<td>M3</td>
<td>Broad money supply, INR</td>
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<td>RBI</td>
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<td>Gross Domestic Product US, constant prices, INR</td>
<td>U.S. Bureau of Economic Analysis (BEA)</td>
</tr>
<tr>
<td>INR</td>
<td>Exchange rate INR/USD</td>
<td>OECD</td>
</tr>
<tr>
<td>O</td>
<td>Oil price, average of Brent, Dubai &amp; WTI, USD per barrel</td>
<td>IMF</td>
</tr>
<tr>
<td>R</td>
<td>Rainfall, mm</td>
<td>India Meteorological Department (IMD)</td>
</tr>
<tr>
<td>D*91</td>
<td>1991 dummy (1991 = 1, other years = 0)</td>
<td>-</td>
</tr>
<tr>
<td>X</td>
<td>Export, volume, INR</td>
<td>OECD</td>
</tr>
<tr>
<td>M</td>
<td>Import, volume, INR</td>
<td>OECD</td>
</tr>
<tr>
<td>P</td>
<td>Portfolio flows, INR</td>
<td>Reserve Bank of India (RBI)</td>
</tr>
</tbody>
</table>

Source: RaboResearch

Table A.1: Description of variables and data sources

Please note the disclaimer at the end of this document.
We use annual data over the period 1960-2019 (see Table A.1). Indices $t$ is year and $\Delta$ denotes the annual (percentage) change. For data that is available at a higher frequency, such as the USD/INR, we take the average value over the year.

### Model results

Table A.2 shows the estimation result of our four equations. We have estimated all four equations for two periods: the complete sample (1960-2019) and a shorter sample (1990-2019). It is important to assess whether or not relationships between the parameters of interest have shifted significantly over time.

**Figure A.2: Estimation results**

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Independent variables ↓</th>
<th>Monetary base</th>
<th>Broad money supply</th>
<th>Inflation</th>
<th>FX</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Constant</td>
<td>7.81** (9.08)</td>
<td>7.62** (5.86)</td>
<td>2.44** (3.11)</td>
<td>1.51** (1.88)</td>
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<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Fiscal deficit</td>
<td>-2.50** (-4.02)</td>
<td>-2.52** (-4.03)</td>
<td>-</td>
<td>-</td>
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<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Current account deficit</td>
<td>-2.71** (-3.14)</td>
<td>-2.36** (-3.18)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Demonetization dummy</td>
<td>-23.68** (-12.48)</td>
<td>-22.92** (-11.48)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Monetary base</td>
<td>-</td>
<td>0.21** (3.83)</td>
<td>0.20** (3.96)</td>
<td>-</td>
</tr>
<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Broad money growth</td>
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<td>-</td>
<td>0.58** (6.69)</td>
<td>0.63** (6.90)</td>
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<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Private sector credit</td>
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<td>-</td>
<td>0.17** (2.20)</td>
<td>0.10** (1.99)</td>
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<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Policy rate</td>
<td>-</td>
<td>-</td>
<td>-0.56** (2.27)</td>
<td>-0.37 (-0.96)</td>
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<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Broad money growth, less than 12%</td>
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<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Broad money growth, 12% growth or more</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Output gap</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
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<td>Inflation</td>
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<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Lagged dependent</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$\Delta (\frac{M_t}{Y_t})$</td>
<td>Dummy 1991</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.33</td>
<td>0.42</td>
<td>0.70</td>
<td>0.76</td>
<td>0.53</td>
</tr>
<tr>
<td>Durbin-Watson statistic</td>
<td>1.77</td>
<td>1.31</td>
<td>2.01</td>
<td>2.63</td>
<td>1.66</td>
</tr>
</tbody>
</table>

Source: RaboResearch

Note: The t-statistics are reported in parenthesis. All estimates with HAC standard errors and covariance. Significant at *10%; **5%; * output gap is lagged one year. * Fiscal deficit is not lagged, current account is lagged one year. * Fiscal deficit is not lagged, current account is lagged one year, economic growth gap is lagged one year.
Our overall conclusion is that the relations between the variables do not change significantly over time. In some cases, the elasticity between variables even increases substantially in the short sample estimate, such as the upward impact of inflation on USD/INR. In general, all variables in the estimated models show the correct sign and are statistically significant most of the time. Moreover, to check whether the models are econometrically sound, we have performed normality, stationarity, autocorrelation, and heteroscedasticity tests. The key relationships that we want to estimate are marked bold in Table A.2. Before we shift our focus to the individual models, it is important to stress that the models depicted in Table A.2 are not the same models that RaboResearch uses for its inflation and INR forecasts and have only been developed to run the forecasts for the purpose of this specific report.

**Monetary base**

The estimate for the monetary base (M0) is only relevant to test whether or not the RBI responds to a deterioration of either the fiscal deficit or current account deficit by increasing the money supply. This seems to be the case. Both variables show a statistically significant negative impact. The coefficient for the fiscal deficit shows that when the fiscal deficit as a ratio of trended real GDP deteriorates by 1%, the monetary base over the trended GDP is expanded by 2.5ppts. This basically shows that the RBI has been facilitating fiscal policy by using monetary expansion (and will continue to do so).

**Broad money supply**

The key relationship that we want to test in the broad money supply model is the correlation with the monetary base, which shows an elasticity of 0.2. This means that increase in the monetary base by 1% (over trended GDP) cranks up the broad money supply by 0.2ppts. We have included a lagged dependent so as to model the recursive process that was stylized in Figure 1. Two important control variables are credit deviation and the change in policy rate, which are also statistically significant and show the correct sign.

**CPI**

In our inflation model, our main target relationship is the link with the broad money growth variable. The impact of this variable is conditional on a threshold value of 12% growth. Tests show that this threshold can be regarded as an inflection point, where inflation picks up more rapidly compared to growth below the threshold. The estimation results show that an additional 1ppt growth in broad money pushes up inflation by 0.30ppts above the 12% threshold, whereas below the threshold, inflation is affected by 0.17ppts. Although \( \alpha_9 \) is not statistically significant (caused by a large standard error related to the limited amount of observations in this range), it is economically relevant, as inflation can rapidly take a turn for the worse. As India did not register M3 growth above the threshold of 12% very often from the 90s onwards, we estimate the impact of broad money without a threshold value and arrive at the smaller coefficient of 0.27 for the small sample estimate. The estimated effect of broad money growth on inflation remains statistically very significant.

The link with the output gap is not very solid, and only statistically significant at 10%. The trajectory of the exchange rate (a depreciation of the INR leads to more expensive imports), the oil price and rainfall are all statistically significant. Rainfall has a negative impact, indicating that a drop in the annual rainfall results due to failed harvest pushes up food price inflation.

**INR**

Our final model estimates the trajectory of the INR. Our target relationship is the impact of inflation on the INR. Our estimates show that a 1% rise in inflation pushes up INR (i.e., INR depreciates against the USD) by 0.4ppts. This effect even seems to have gained in strength when estimated for the smaller sample (1990-2019). The fiscal deficit and current account deficit are
statistically significant and show the expected negative sign: if these deficits widen, rating agencies tend to lower ratings, and investors get spooked and pull out of Indian assets (equities and bonds). As Indian assets are denominated in INR, demand for INR plunges and the exchange rate goes down the drain. The effect of deteriorating fiscal metrics on the INR is quite substantial.

**Credit deviation**

As the monetary base increases, banks can choose to use the excess liquidity above the Reserve Requirement Ratio (RRR) to grant more loans to businesses and consumers in the real economy. If these loans are granted, the money multiplier kicks in and the broad monetary base grows by an amount that is larger than the growth of the monetary base. But if there isn’t sufficient demand for credit, the money multiplier effect doesn’t fully kick in and the broad money supply doesn’t grow as fast. We have included the deviation from the credit to GDP ratio trend to capture this effect.
Appendix B: Assumptions

**Fiscal deficit**

We forecast the central government fiscal deficit of India to reach around 6.9% of GDP over 2020. India already increased borrowing to INR 12 trillion over FY2020/21 from the initially budgeted INR 7.8 trillion. This implies an increase of 2.1ppt of GDP compared to what was initially budgeted. Tax revenues are expected to fall by 5% (y-o-y) accompanied by a similar loss in non-tax revenue. An expected increase in economic activity in the second half of the fiscal year combined with increased tax filing will limit the deficit to about 6.9%.

Any additional growth of the monetary base under MMT (i.e., money printing scenario) directly results in a larger fiscal deficit. The Modi government launched a stimulus package worth USD 270bn (or 20 lakh crore) in May, which is approximately 10% of GDP. In our money-printing scenario, we assume that the Modi government doubles the efforts and launches another 20 lakh crore package, but this time the package is financed by rupees printed by the RBI.

Another 20 lakh crore package both stimulates GDP growth and potential economic growth (when allocated towards productivity-enhancing investment), but at the same time it increases the fiscal deficit. This results in a higher fiscal deficit of 2.5ppts in 2020, 3.9ppts in 2021 and 1.9ppts in 2022. The remainder of the 10% GDP investment packages is accounted for by the increase in nominal fiscal spending in the subsequent years.

**Current account**

We use a model to forecast India’s current account deficit. As the current account deficit is a key parameter in the MMT discussion, we elaborate on this model explicitly:

\[
\frac{CA_t}{Y_t} = \gamma + \alpha_1 \left( \frac{X_t - M_t}{Y_t} > 2 \right) \cdot \left( \frac{X_t - M_t}{Y_t} \right) + \alpha_2 \left( \frac{X_t - M_t}{Y_t} \leq 2 \right) \cdot \left( \frac{X_t - M_t}{Y_t} \right) + \alpha_3 \Delta(INR_{t-1}) + \alpha_4 \Delta(P_{t-1}) + \gamma_t + \epsilon_t
\]

(4)

where the current account balance (CA) is expressed as percentage of nominal GDP (\(Y^N\)), the variable related to coefficient \(\alpha_1\) and \(\alpha_2\) represents a trade balance proxy, which is expressed as net exports (export minus import) divided by GDP.

<table>
<thead>
<tr>
<th>Coefficient and variables</th>
<th>(\Delta \left( \frac{CA_t}{Y_t} \right) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>(c)</td>
<td>Constant</td>
</tr>
<tr>
<td>(\alpha_1)</td>
<td>(\frac{X_t - M_t}{Y_t} &gt; 2) (\frac{X_t - M_t}{Y_t})</td>
</tr>
<tr>
<td>(\alpha_2)</td>
<td>(\frac{X_t - M_t}{Y_t} \leq 2) (\frac{X_t - M_t}{Y_t})</td>
</tr>
<tr>
<td>(\alpha_3)</td>
<td>(\Delta(INR_{t-1}))</td>
</tr>
<tr>
<td>(\alpha_4)</td>
<td>(\Delta(P_{t-1}))</td>
</tr>
<tr>
<td>(\gamma)</td>
<td>Time dummies</td>
</tr>
<tr>
<td>Durbin-Watson statistic</td>
<td>R²</td>
</tr>
<tr>
<td>Period</td>
<td></td>
</tr>
</tbody>
</table>

Table A.3: Estimation results CA model

Source: RaboResearch, Macrobond, RBI, IMF, OECD

As was the case in the inflation equation, the trade balance proxy is subject to a threshold value of 2% of GDP. The idea behind this threshold is that if the trade deficit deteriorates beyond the 2% threshold, the impact on the current account deficit becomes larger as well. Controls are the y-o-y...
mutation of the rupee (INR), portfolio flows (P) and time dummies (\( \cdot \)). The model is estimated using quarterly data for the period 1996-2019. The results are presented in Table A.3. Despite a significant improvement of the current account in the last quarter of 2019, we expect a deterioration of the current account going forward due to more expensive imports caused by a pick-up in commodity prices and the weak INR (Figure A.1). By the end of this year, the current account deficit is set to narrow again, but we expect that it will remain in negative territory.

In the money-printing scenario, we expect imports to grow faster than exports and the real economy. Extra government investments will lead to a net decrease of the current account balance. This results in a prolonged deterioration of the current account deficit, which is only gradually set to recover after 2022 (Figure A.1).

Figure A.1: Current account is pushed back in the red

![Figure A.1: Current account is pushed back in the red](image)

Source: RaboResearch

**Monetary base**

We forecast the growth of the monetary base to GDP ratio to continue around 11% a year for the forecasting period. These figures are based on historical growth.

In our money-printing scenario we have included a growth of the monetary base (vis-à-vis the base case) in 2020, followed by a steep increase in 2021 and a gradual wind-down from thereon. This will effectively result in an increase of the monetary base of 30% for 2020, 35% for 2021 and 19% for 2022. Afterwards, the growth in the monetary base returns to the growth in the base scenario. From a historical perspective, this is not out of the ordinary: double-digit growth figures for the monetary base are frequently observed phenomena.

**Credit deviation**

We forecast the credit trend to deviate further in 2020 to -12% of GDP, due to the COVID-19 crisis. Afterwards, when economic growth picks up again, we forecast a small positive deviation of 3%. Afterwards, the credit deviation from the trend returns to zero. These figures are in line with historical credit deviations.

Compared to the base case, credit demand rises significantly due to the economic boost that the extra government investments give to the economy. We forecast the deviation of the credit trend to amount to 5% of GDP in 2020. Afterwards, when economic growth picks up again, and freshly printed rupees flow into the economy, we forecast a positive deviation of 14% for 2021 and 12% for 2022. Afterwards, we return to the trend. These figures are in line with historical credit deviations during times of double digit M0 growth.
**Policy rate**

The policy rate in our baseline scenario is based on Rabobank’s official inflation forecasts (Figure A.2). We expect the Reserve Bank of India (RBI) to cut the repo rate by another 50bps in 2020Q3 and keep rates on hold until the second half of 2021, as inflation is expected to rise at the start of 2021.

**Figure A.2: The RBI is expected to hit the brakes earlier in the money-printing scenario**

![Graph showing policy rate](image_url)

Source: RBI, Macrobond, RaboResearch

In our money-printing scenario, we expect the Reserve Bank of India (RBI) to hit the brakes at an earlier stage in order to put a leash on rising inflation. Therefore, we expect the RBI to hike interest rates by 175bps over 12 months in this scenario. While this is not modelled, should the RBI go ‘full MMT’ - resulting in an unwillingness to raise rates at the same time as it is monetizing public debt - then the negative impact of MMT on CPI and INR would naturally be far more significant.

**Economic performance**

**Economic growth**

Printing money to mitigate the pain of the COVID-19 crisis does have a favorable impact on economic activity. A government can allocate the freshly printed rupees to provide aid for the most vulnerable, alleviate stress for corporates, or allocate funds to infrastructural projects and education. Besides higher economic growth due to spending, we also assume that 25% of the money printed is used in investment, which leads to a higher capital stock, and as such results in higher potential growth. Moreover, we assume the investment impulse will also generate slightly better innovation and education metrics, which will push up long-term productivity. The assumptions on economic growth and structural growth are illustrated in Figure A.3. Cumulatively, these extra government investments lead to 2ppts of extra GDP growth.

**Figure A.3: Extra government investments lead to higher (potential) economic growth**

![Graph showing economic growth](image_url)

Source: RaboResearch, CSO, Macrobond
One final important remark is that economic growth will be heavily affected by the peak in inflation and the crash of the INR in our money-printing scenario. However, we have not calculated these adverse economic growth effects endogenously and, therefore, have left out any forecasts in Figure A.3 beyond 2022.

**Output gap**

The output gap is determined by comparing GDP growth to potential GDP growth. We forecast a negative output gap of nearly 9% for 2020 (due to the COVID-19 crisis) and a sharp rebound of 3.8% the following year due to a technical recovery. Afterwards, we assume a neutral trend, i.e. the output gap is near zero.

In the money-printing scenario, the output gap is adjusted by raising both economic growth as well as potential growth. The extra growth spurs the economic recovery in 2021 and widens the output gap to a positive balance of 3.8%. From 2023 onwards, this effect fades and the output gap returns to a near-neutral stance. Compared to the baseline, the growth of potential output is 6ppt higher (due to additional investment) in our money printing scenario over the period 2020-2025.

**Growth gap vis-à-vis the US**

We forecast the growth gap between India and the US to reach around 4.2ppt in 2020. The year after, the gap widens to 7.5ppt. This is mainly due to a slower recovery from the COVID-19 crisis in the US. Based on our long-term forecasts, for both the United States and India the gap returns to more moderate values at 3.6% from 2023 onwards.

The growth gap between India and the US is adjusted for the higher economic growth as described above. The gap widens by 0.3ppt in 2020, by 1.2ppt in 2021 and by 0.6ppt in 2022. Afterwards the difference between the base case and the alternative scenario disappears.

**Oil price**

The oil price is based on forecasts from our commodity strategist Ryan Fitzmaurice (Figure A.4). The forward curves for both Brent and WTI have firmed up quite remarkably in recent weeks as spot prices have rebounded sharply from the lows. However, there is still an enormous and growing amount of inventories that will need to be financed in the weeks and months ahead until the market has time to rebalance. Nevertheless, the oil market has continued to show impressive strength recently and dips have generally been bought. As a result, we are mindful to not get overly bearish in an environment with so much central bank support pumping through global financial markets.

![Figure A.4: Oil price on upward trajectory](image)
Rainfall

For 2020, we have used the meteorological forecast of the India Meteorological Department (IMD) for 2020. For the remainder of the forecasting period we have assumed that the rainfall will be conform the historical average.
### Rates Strategy

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Phone Number</th>
<th>Email</th>
</tr>
</thead>
<tbody>
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### Credit Strategy & Regulation

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<th>Name</th>
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<tbody>
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### Energy & Metals

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</tr>
</thead>
<tbody>
<tr>
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### Agri Commodity Markets

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<tr>
<th>Name</th>
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<tbody>
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</tr>
</tbody>
</table>
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