Twitter Thread by Crypto Voices

Crypto Voices
@crypto_voices

Election day in US; to skip the politics and get straight to the money, here's our quarterly update. How do gold, silver, and government fiat money compare with bitcoin's 21 million? #Bitcoin is the 10th largest money in the world, ex-gold & silver. This is update #10.

The Crypto Voices latest release on the *Global Monetary Base* As of month end Sep-2020:		
Comprised of the top floating currencies in the world:		30 currencies
These currencies are directly used by:		61 countries
These currencies are pegged or boarded (indirectly used) by an additional:		52 countries
These currencies represent a global share of:	94% of GDP	78% of pop.
Total value of the monetary base across the globe:		$25.0 trillion
The largest monetary base in the world is the Japanese yen:	¥606.0 trillion	$5.7 trillion
The monetary base of the US dollar itself is:	Ranked #3	$4.9 trillion
This money supply compares with gold's available stock:	5.3 billion oz.	$10.1 trillion
This money supply also compares with bitcoin's supply:	฿18.5 million	$0.3 trillion
	ex- gold & silver	*w/ gold & silver*
This ranks bitcoin across all global money:	Ranked #10	Ranked #12

2/ Bitcoin's monetary system marches on its continuously-lowering coin emission; meanwhile, other world monetary systems' units inflate, either naturally (like gold & silver ounces), or via monopolistic privilege (like government fiat money "printing").

3/ What follows isn't a lesson in stimulus or bailouts, whatever the world faces. It's an attempt at painting the monetary landscape around the globe. The dollars, euros, and yen we're all familiar with, collectively, are worth $25 trillion. This is an exercise in perspective.

4/ As many know, the response from governments worldwide to Covid-19 has been drastic, so expect big moves. Also interestingly, central banks have been much slower to update their data these days.

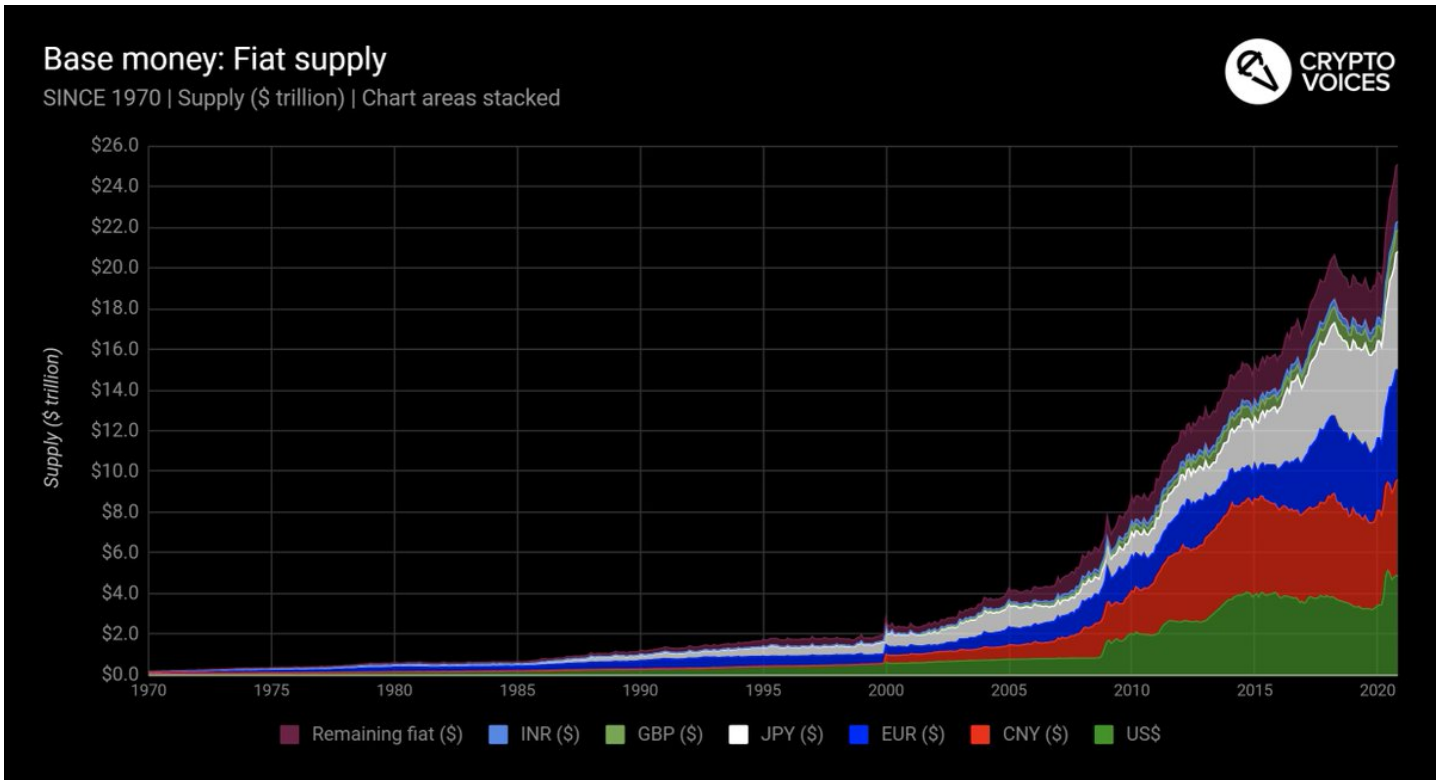
5/ Gold & silver is base money of the past. Government fiat is base money today. It comprises both physical cash… and a digital cash component. Bitcoin may be base money of the future. Before we get to the charts, it's important to clarify a few common misconceptions in money.

6/ The first is everyone looking to value Bitcoin always jumps to the "narrow" or "broad" money supplies (M1/M2/M3). This is incorrect. The reason is those money supplies represent "claims" on something else. What is that something else? Answer: the base money supply.

7/ Fiat base money today includes both physical (notes & coins) and digital (bank reserves at the central bank) components. Think of the digital part as the "account" each bank holds with its central bank. This & only this money supply compares economically with 21 million BTC.

8/ Another mistake that's often made when comparing bitcoins to the analog monetary world is looking at a simple chart like US M1, or Eurozone M2. Besides again being incorrect on the M1/M2/M3 comparison, this method is inadequate because Bitcoin is global, and those... are not.

9/ We can't simply look at one or two nation states' base money supplies to gauge any kind of market depth. The sample must be global. We've done that here, tracking the top 30 floating currencies in the world. This is how the real, global fiat base money supply looks since 1970.



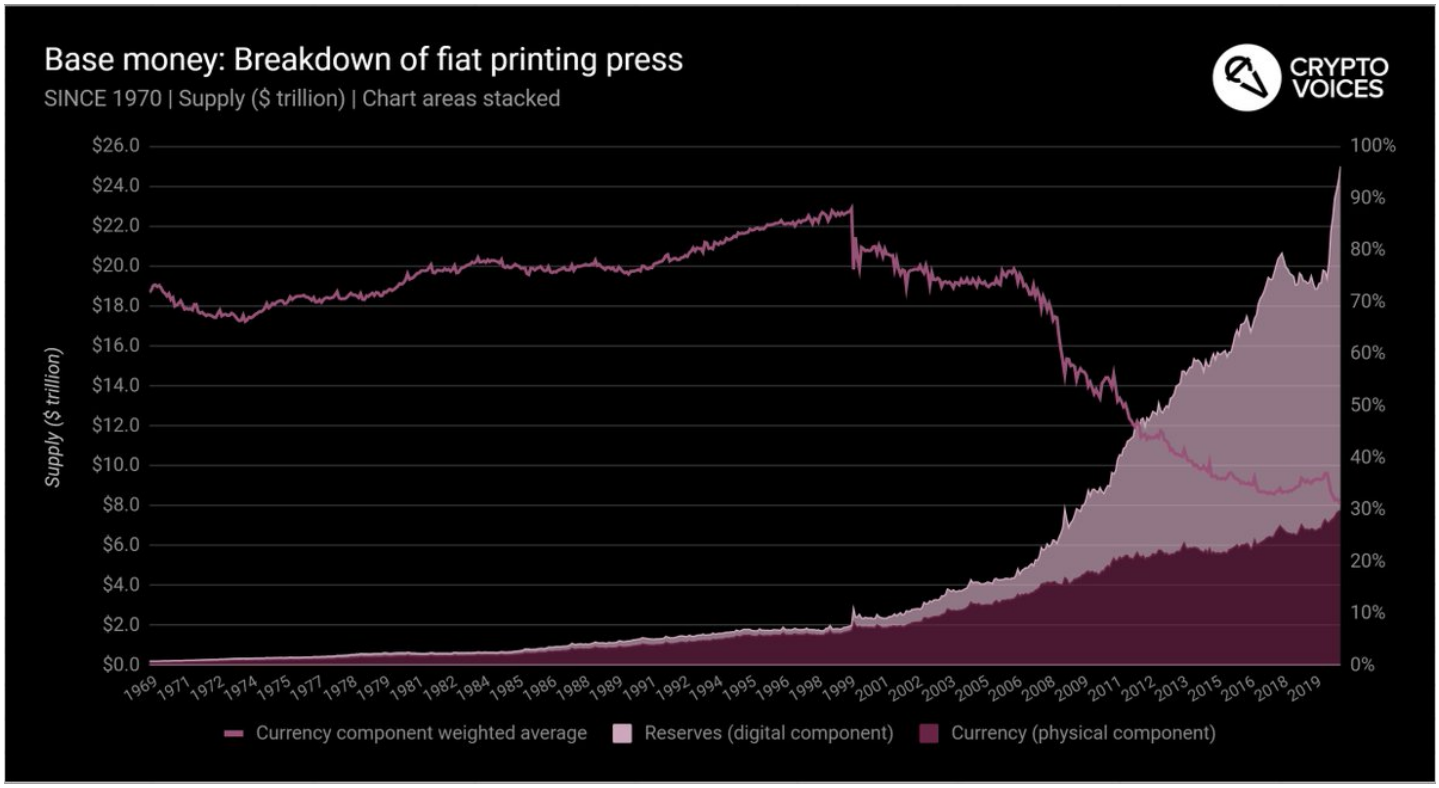
10/ This top 30 base money sample in fact covers 95% of global GDP, 113 countries, and 64 currencies. Why? The euro is one reason. The other is these countries/currencies either use one of these floating top 30 directly, or are legally pegged or fixed to one via currency board.

11/ More on the above image. The "ordering" of this graph is by GDP per currency bloc. Two major shifts happened in 2019. The first is that India's GDP is now larger than the UK's; therefore, both the INR and GBP base monies are now listed (even

though the pound remains larger).

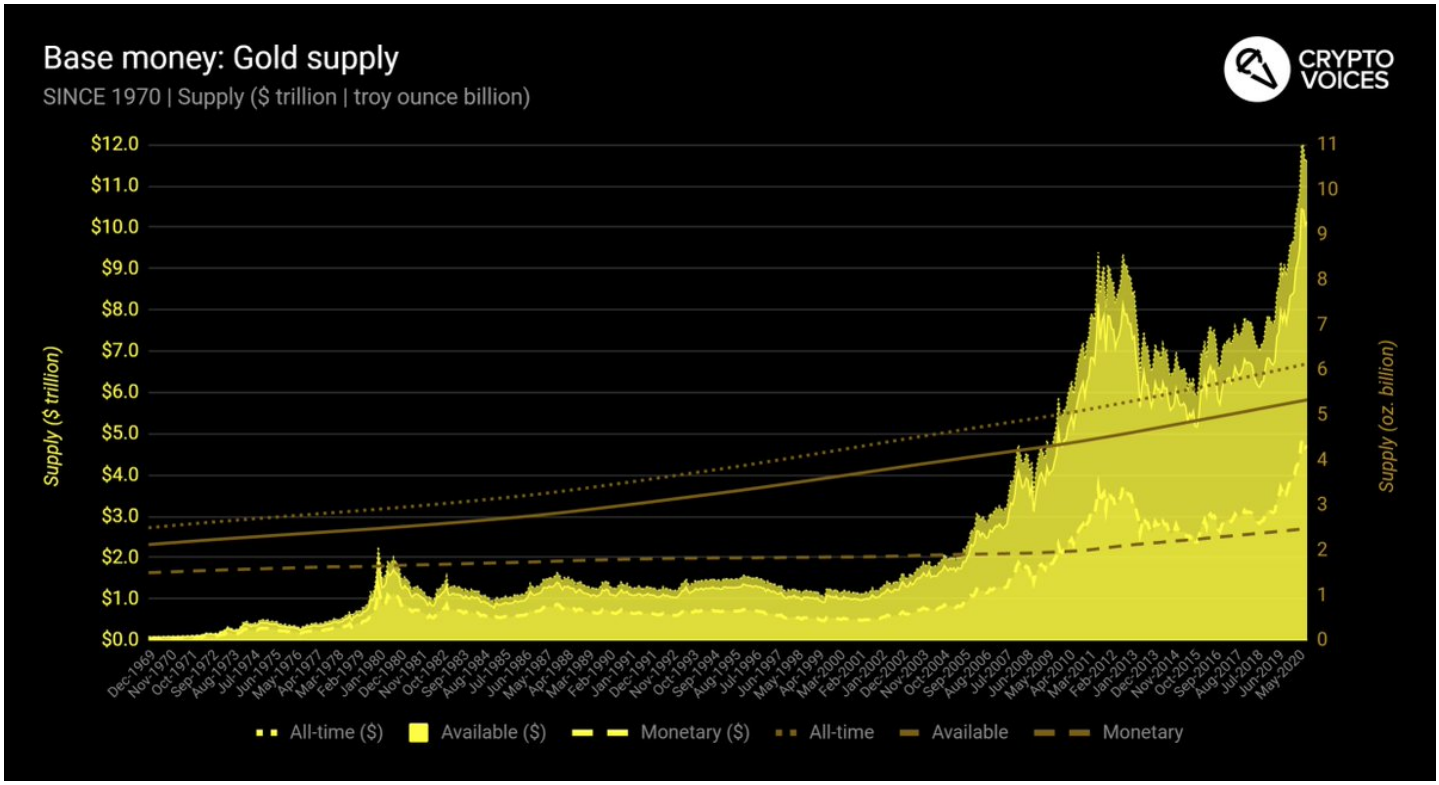
12/ The 2nd & bigger shift is China. In 2019 China's GDP surpassed that of the Eurozone nations (note China's not larger than the EU in total, just EU countries that use the euro). Therefore, in both GDP and size of its base, China's yuan now is ordered just after the dollar.

13/ Let's look again at the global base money supply curve since 1970, but this time see how the split shakes out between physical versus digital base money. Note how bank reserves (the digital printing press) drastically increased its overall % from the 2008 financial slide.

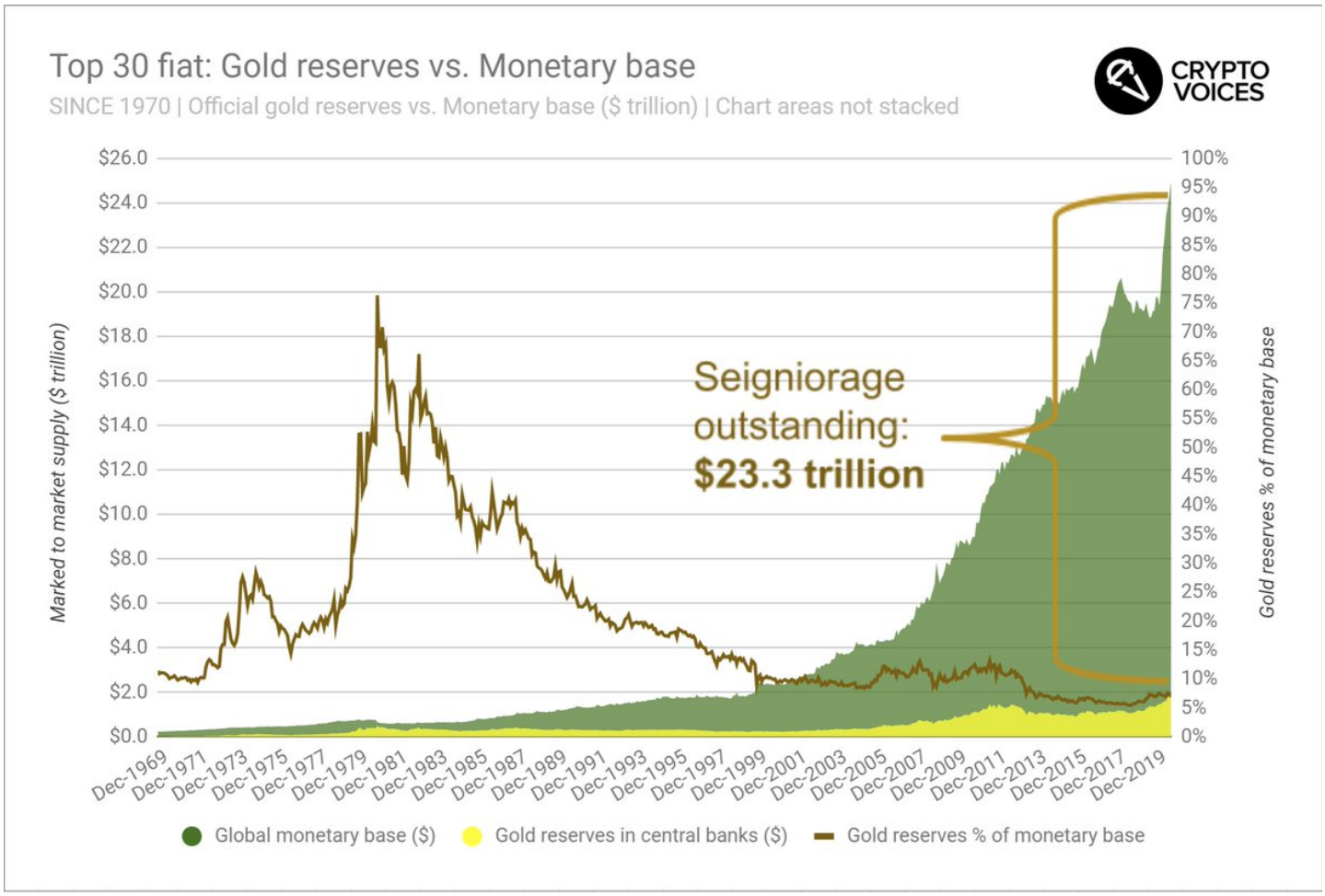


14/ Final point on fiat money. The monetary base is in fact a graph of the money monopoly today; meaning, it is the source of the printing press, and only central banks control this. If you're curious where to find it, the answer is simple: the balance sheet of each central bank!

15/ Now let's look at gold. Central banks still hold gold, but it no longer acts as basic money. A few points coming on this, but everyone should still understand the global gold supply in both its native market unit (ounces), and in today's unit of account (US dollars).



16/ Still on gold, here's a chart you don't see everyday. It's central bank gold holdings vs. their monetary bases. For those that still view gold as a market money, then any fiat money central banks can print above their gold holdings is - by definition - seigniorage.



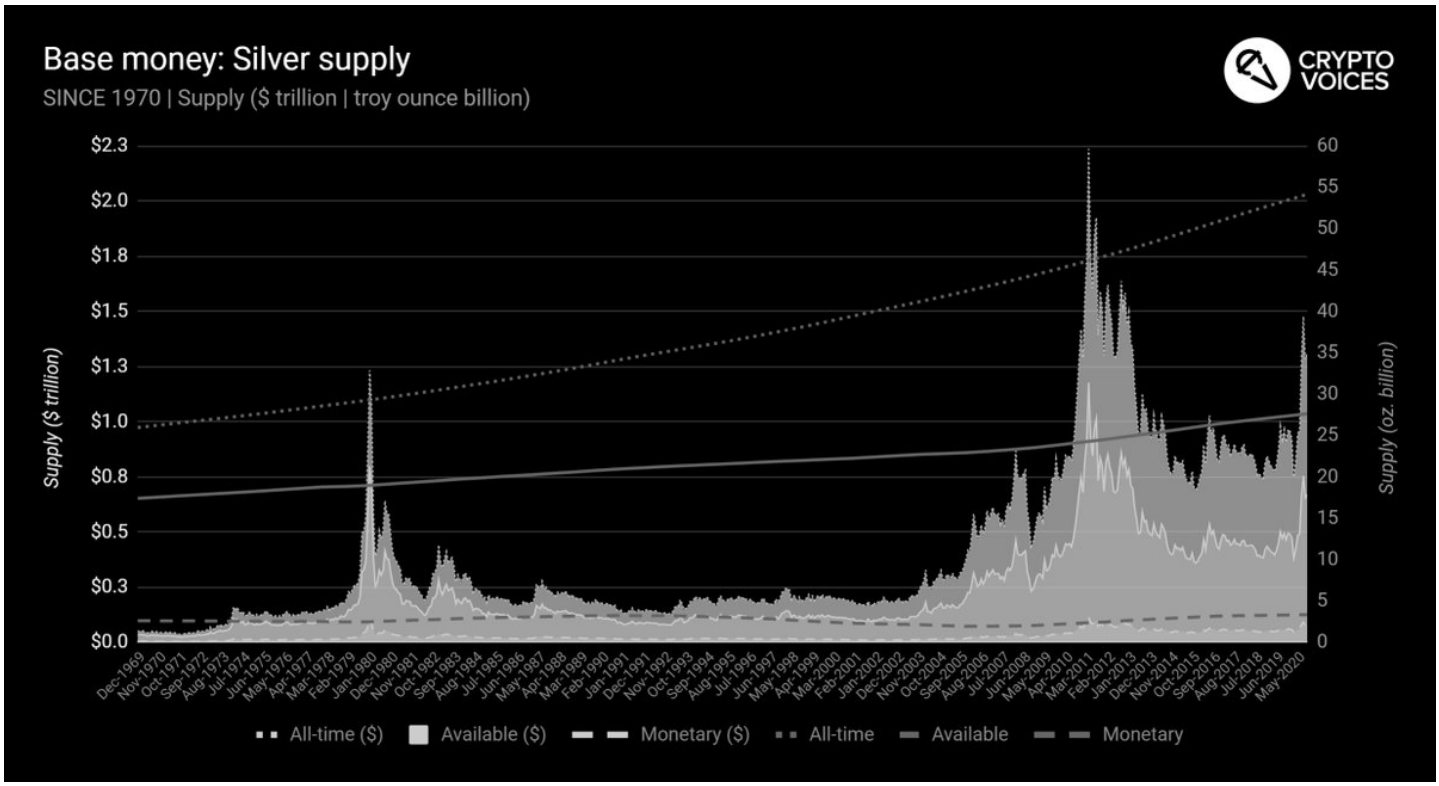
17/ True, many emerging market central banks are net buyers of gold these days. But actually central banks hold less gold collectively than in 1965. Notice how high the proportion of gold reserves-to-issued base money was in 1980 (both valued in US$). Today, it's only 7%.

18/ In other words, central banks collectively have issued $23.3 trillion in base money *above* the value of their gold holdings (again, both marked to market in USD). This is an important fact that has implications for central bank money printing, for gold, and for bitcoin.

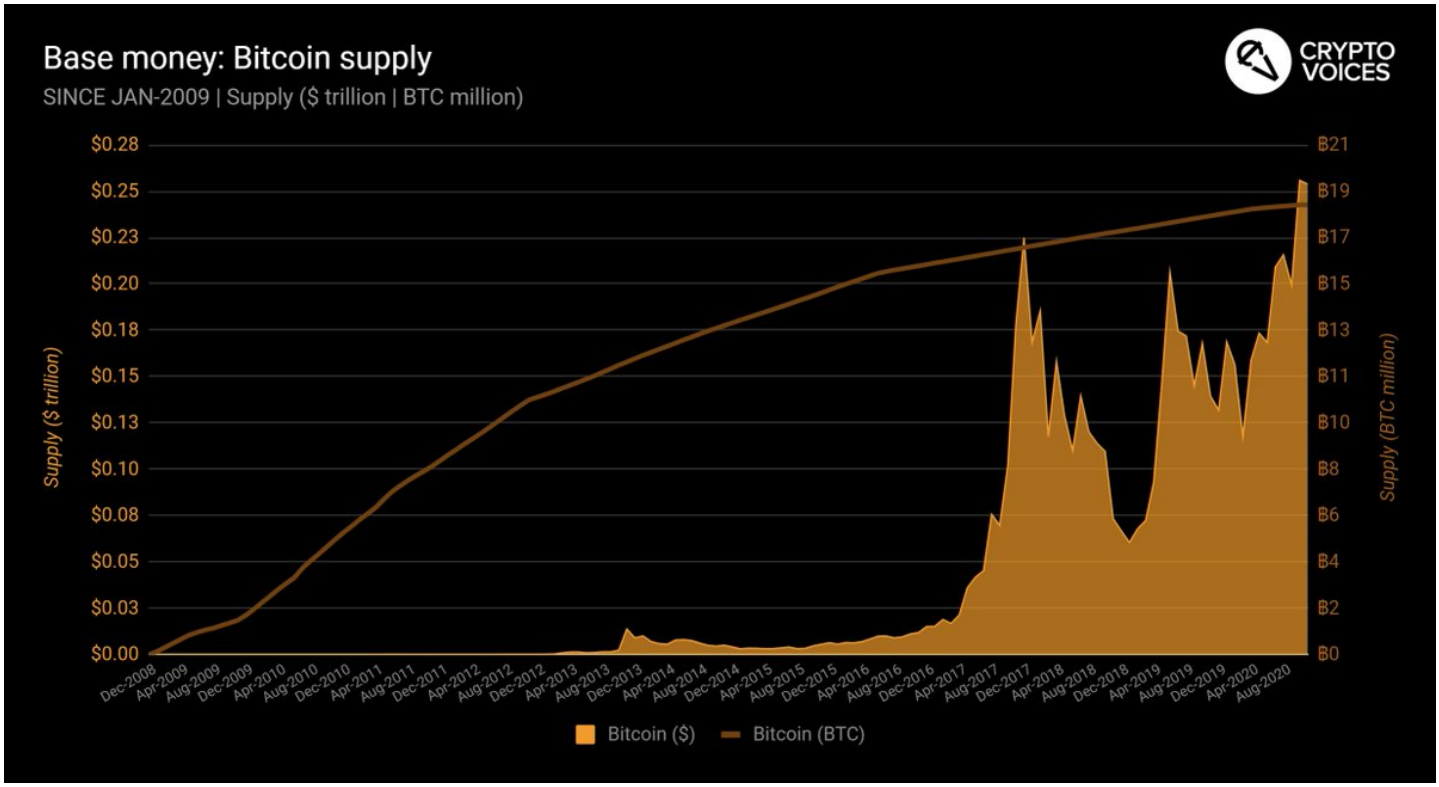
19/ What is that implication? So far, the money monopoly "works" for central banks, and for their governments. It's virtually costless: fiat has proven to be nearly "unconstrained" by the market value of gold. Some claim CBs manipulate the gold price; we won't address that here.

20/ As for #bitcoin, if and when it becomes large enough to be on that chart, and/ or held by central banks, then and only then will we have any idea as to what bitcoin "costs" central banks. For now, bitcoin "costs" central banks nothing in seigniorage; it's a rounding error.

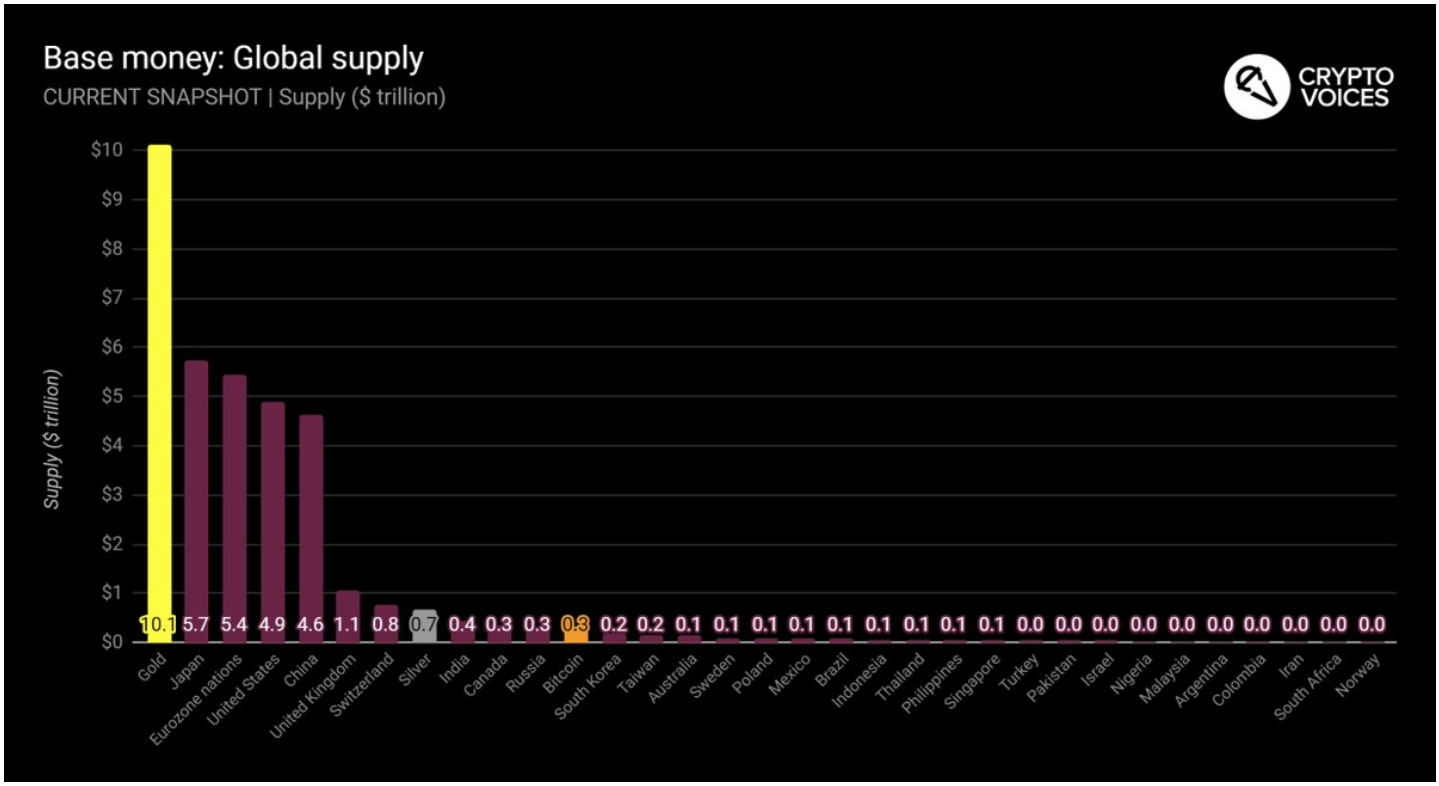
21/ Now silver. 53 billion ounces of the stuff has been mined throughout humanity. Note, we include 3 categories for both gold & silver: "all-time" mine production, "available" estimates (i.e. not lost to industry), and "monetary" estimates (bullion). Since 1970, this is silver.



22/ And finally Bitcoin. Bitcoins are limited by the protocol to an eventual 21 million in supply by the year 2141. Bitcoins may circulate as base money of the future. Here is its global supply, both in native units (bitcoins), and in today's unit of account (US dollars).



23/ And now we'll put them altogether - global fiat, "available" gold, "available" silver, and bitcoin - today. Without further commentary, note that the Bitcoin system is now the 10th largest money in the world, and the 12th largest money including gold & silver.



24/ And for a broad, historical ranking in table format, a progression of all money for the entirety of #Bitcoin's history since 2009, that information is here.

PROGRESSION OF THE GLOBAL MONETARY BASE
US$ trillion equivalent

~ Gold & silver | Base money of the past ~
~ Top 5 fiat currencies | Base money of the present ~
~ Bitcoin | Possible base money of the future ~

CRYPTO VOICES

Period End	AU gold	JPY yen	EUR euro	USD dollar	CNY yuan	GBP sterling	AG silver	BTC bitcoin
Dec-2009	#1 $4.74	#5 $1.14	#4 $1.75	#3 $2.03	#2 $2.11	#7 $0.33	#6 $0.40	n/a $0.00
Dec-2010	#1 $6.25	#5 $1.34	#4 $1.56	#3 $2.02	#2 $2.81	#7 $0.31	#6 $0.75	n/a $0.00
Dec-2011	#1 $6.98	#5 $1.62	#4 $2.01	#3 $2.62	#2 $3.57	#7 $0.35	#6 $0.68	n/a $0.00
Dec-2012	#1 $7.66	#5 $1.60	#4 $2.19	#3 $2.68	#2 $4.05	#7 $0.56	#6 $0.75	n/a $0.00
Dec-2013	#1 $5.65	#4 $1.92	#5 $1.86	#3 $3.72	#2 $4.48	#6 $0.61	#7 $0.49	n/a $0.01
Dec-2014	#1 $5.71	#4 $2.30	#5 $1.70	#3 $3.93	#2 $4.74	#6 $0.58	#8 $0.40	n/a $0.00
Dec-2015	#1 $5.17	#4 $2.96	#5 $2.04	#3 $3.84	#2 $4.27	#6 $0.56	#8 $0.36	n/a $0.01
Dec-2016	#1 $5.71	#3 $3.75	#5 $2.60	#4 $3.53	#2 $4.45	#6 $0.56	#8 $0.42	#31 $0.02
Dec-2017	#1 $6.58	#3 $4.26	#5 $3.70	#4 $3.85	#2 $4.95	#6 $0.74	#8 $0.46	#11 $0.22
Dec-2018	#1 $6.61	#3 $4.60	#4 $3.64	#5 $3.40	#2 $4.81	#6 $0.73	#8 $0.42	#19 $0.07
Dec-2019	#1 $7.98	#2 $4.77	#4 $3.56	#5 $3.43	#3 $4.66	#6 $0.75	#8 $0.49	#13 $0.13
Sep-2020	#1 $10.12	#2 $5.74	#3 $5.44	#4 $4.88	#5 $4.65	#6 $1.05	#8 $0.67	#12 $0.25

All figures in $US trillion; ranked at displayed period end, according to market exchange rates with US$.

Note on last row: All fiat currencies' value reflects the latest quarter displayed; however, gold, silver, and bitcoin's latest value is ranked as of 3-Nov-2020.

Bitcoin ranked once broken into top-30 fiat currencies' monetary base value.

25/ And for those that wish to see that progression against the remaining fiat currencies, and how quickly (if) #Bitcoin passed each one, that chart is here. Note that as of this posting, #Bitcoin is on the cusp of surpassing the Russian ruble for the first time ever.

PROGRESSION OF BITCOIN'S VALUE
VERSUS GLOBAL FIAT CURRENCIES' MONETARY BASE VALUES

CRYPTO VOICES

Sovereign	Fiat currency	Exchange rate regime	Current fiat rank	Date when BTC first surpassed	Fiat value when BTC first surpassed (US$ trillion)	Fiat monetary base value now (US$ trillion)	BTC still surpassed?
Japan	yen	Free floating	1	n/a	n/a	$5.74	No
Eurozone nations	euro	Free floating	2	n/a	n/a	$5.44	No
United States	dollar	Free floating	3	n/a	n/a	$4.88	No
China	yuan	Other managed arrangement	4	n/a	n/a	$4.65	No
United Kingdom	pound sterling	Free floating	5	n/a	n/a	$1.05	No
Switzerland	franc	Floating	6	n/a	n/a	$0.78	No
India	rupee	Floating	7	n/a	n/a	$0.43	No
Canada	dollar	Free floating	8	Aug-2017	$0.07	$0.34	No
Russia	ruble	Free floating	9	n/a	n/a	$0.26	No
South Korea	won	Floating	10	Nov-2017	$0.14	$0.18	Yes
Taiwan	NT dollar	Free floating	11	Nov-2017	$0.13	$0.16	Yes
Australia	dollar	Free floating	12	Oct-2017	$0.08	$0.15	Yes
Sweden	krona	Free floating	13	Aug-2017	$0.06	$0.10	Yes
Poland	złoty	Free floating	14	Aug-2017	$0.06	$0.09	Yes
Mexico	peso	Free floating	15	Oct-2017	$0.07	$0.08	Yes
Brazil	real	Floating	16	Oct-2017	$0.08	$0.08	Yes
Indonesia	rupiah	Floating	17	Aug-2017	$0.08	$0.07	Yes
Thailand	baht	Floating	18	Aug-2017	$0.05	$0.07	Yes
Philippines	peso	Floating	19	Aug-2017	$0.06	$0.06	Yes
Singapore	dollar	Crawl-like arrangement	20	Aug-2017	$0.05	$0.06	Yes
Turkey	lira	Floating	21	Jul-2017	$0.04	$0.05	Yes
Pakistan	rupee	Other managed arrangement	22	Jul-2017	$0.04	$0.05	Yes
Israel	new shekel	Floating	23	May-2017	$0.03	$0.04	Yes
Nigeria	naira	Stabilized arrangement	24	Oct-2016	$0.01	$0.04	Yes
Malaysia	ringgit	Floating	25	May-2017	$0.04	$0.03	Yes
Argentina	peso	Floating	26	Aug-2017	$0.05	$0.03	Yes
Colombia	peso	Floating	27	May-2017	$0.03	$0.03	Yes
Iran	rial	Free floating	28	Aug-2017	$0.05	$0.02	Yes
South Africa	rand	Floating	29	Feb-2017	$0.02	$0.02	Yes
Norway	krone	Free floating	30	Jul-2016	$0.01	$0.01	Yes
						$25.00	

Fiat currencies' current values reflect latest quarter ending 30-Sep-2020.

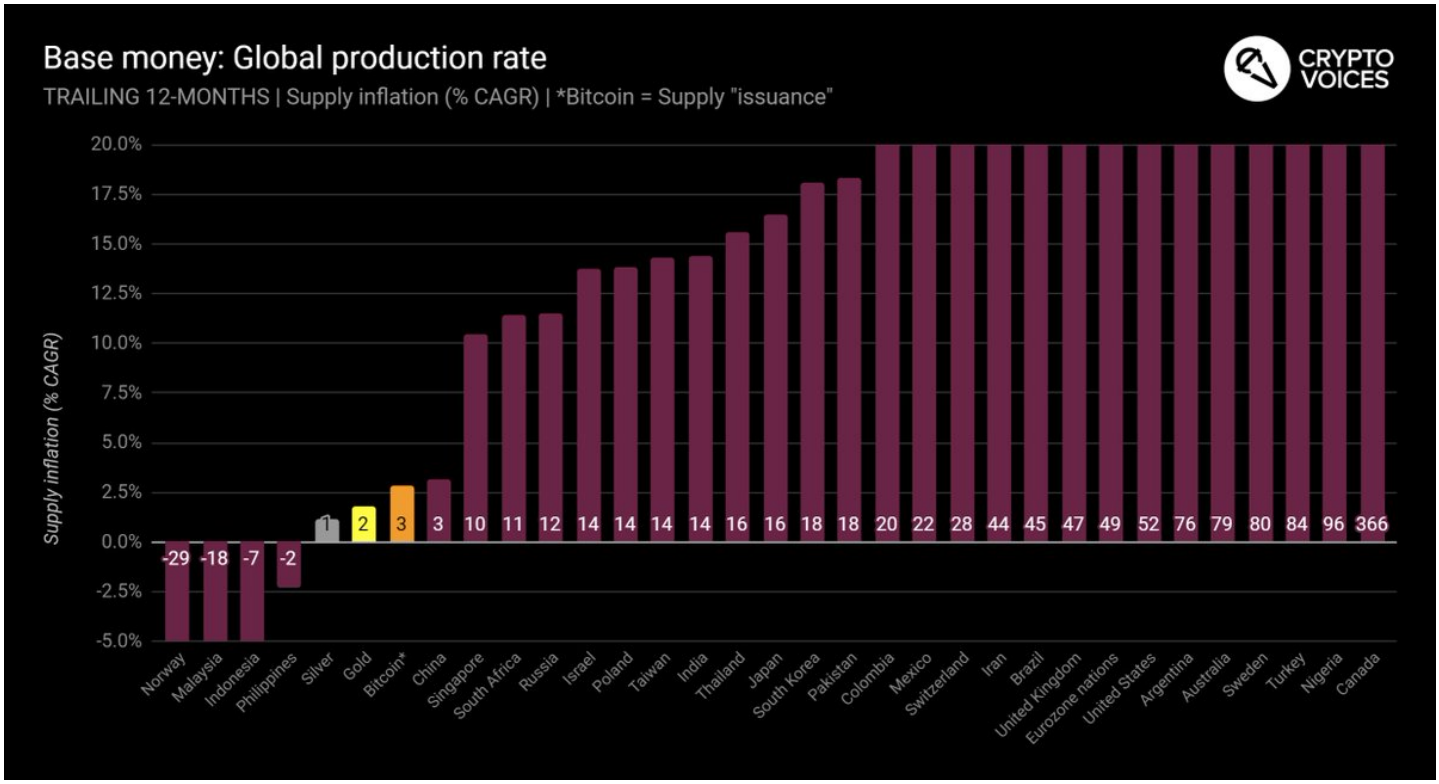
Bitcoin's current comparison value reflected in last column is as of 3-Nov-2020.

26/ Now for the main event of this analysis: Inflation. Inflation today means "price increases." It's usually measured by the central bank and usually wrong. There is no way all prices can ever be measured in a simple index. The input variables are changed all the time to boot.

27/ When we analyze inflation, we are using the classical definition, which is "monetary inflation." In other words, "money growth," or "money production." Understanding this rate of increase can be very helpful when trying to understand money.

28/ Inflation is one of the most important things to understand about money, in fact. Money growth inflation reflects scarcity. But to be clear... ■ The charts that follow have nothing to do with price growth or prices at all. ■

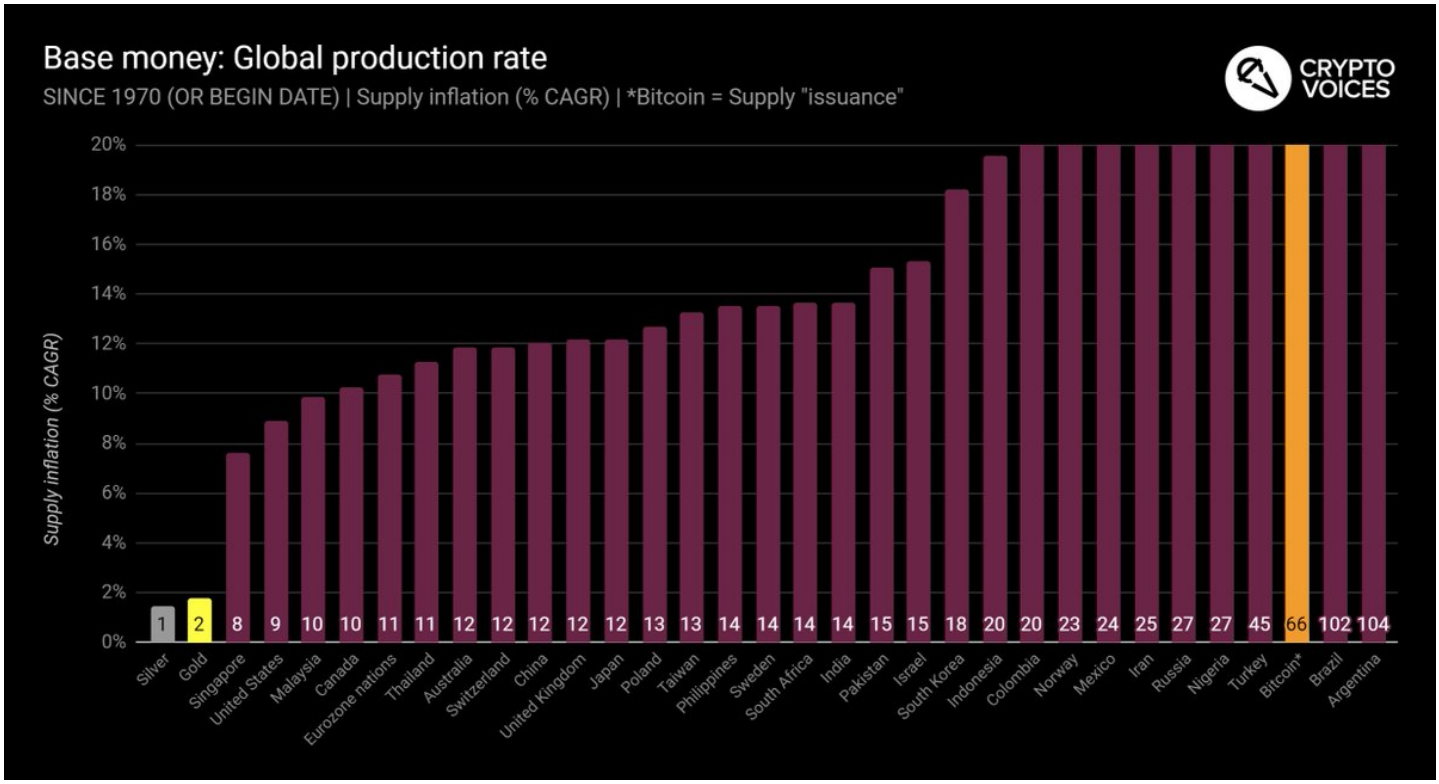
29/ Let's jump to it. This is the last 12 mos. of all base money growth. Remember, this is "unit" growth. % changes in dollars, euros, or yen, ounces of gold, or bitcoins. Big numbers.



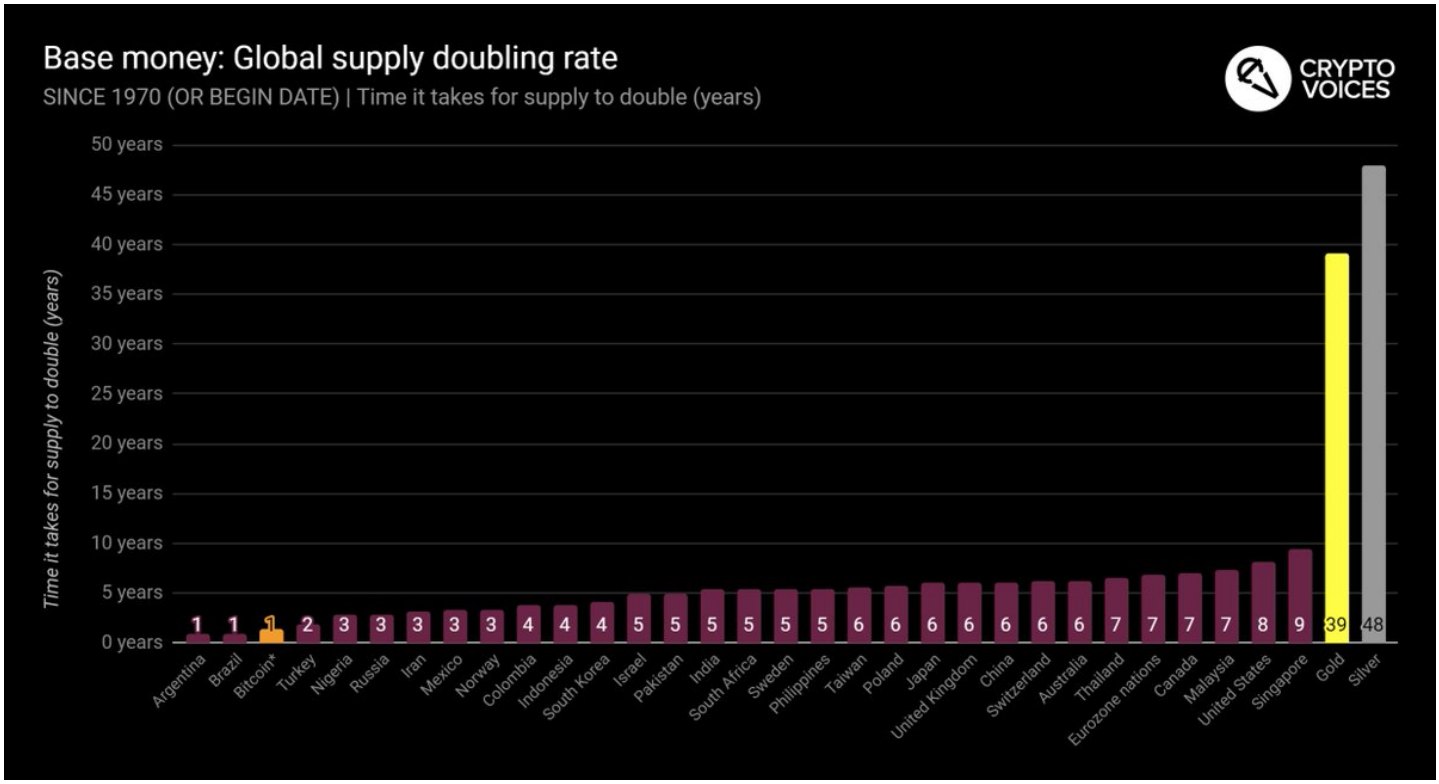
30/ But we need to look deeper. It helps to look long-term. Remember the global fiat supply curve? ■In 1970, the US$ equivalent of global base money was $200 billion. Today: $25 trillion. What does this mean? To understand it, you need to understand compound annual growth.

31/ Compound annual growth is an extremely important metric. It's "stronger" than a simple, annual rate (https://t.co/iT7h6VhACz). We can use this rate to understand investment returns, or long-term trends like population growth. We can also derive doubling time from this figure.

32/ So let's start with the compound annual growth rates for the global monetary base since 1970. 50 years of data. About half the countries' data goes back this far. For the rest, % displayed is since their start date. For bitcoin, the start date is Jan-2009.

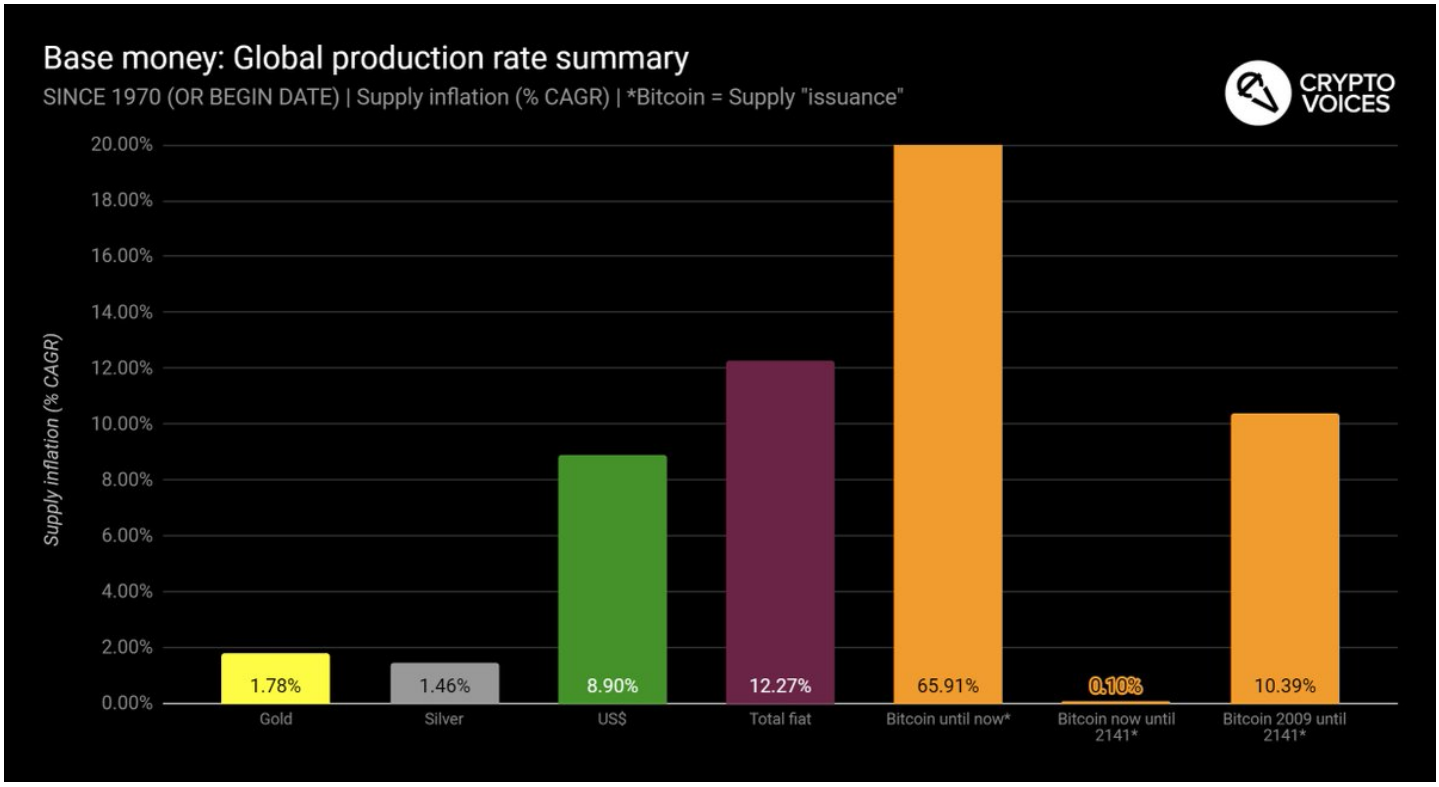


33/ Doubling time also helps. From compound growth %, we can determine exactly how long it takes for an asset's supply to double. Here is the exact same chart as just shown, since 1970 (and since 2009 in Bitcoin's case), but displaying doubling time instead of compound growth.

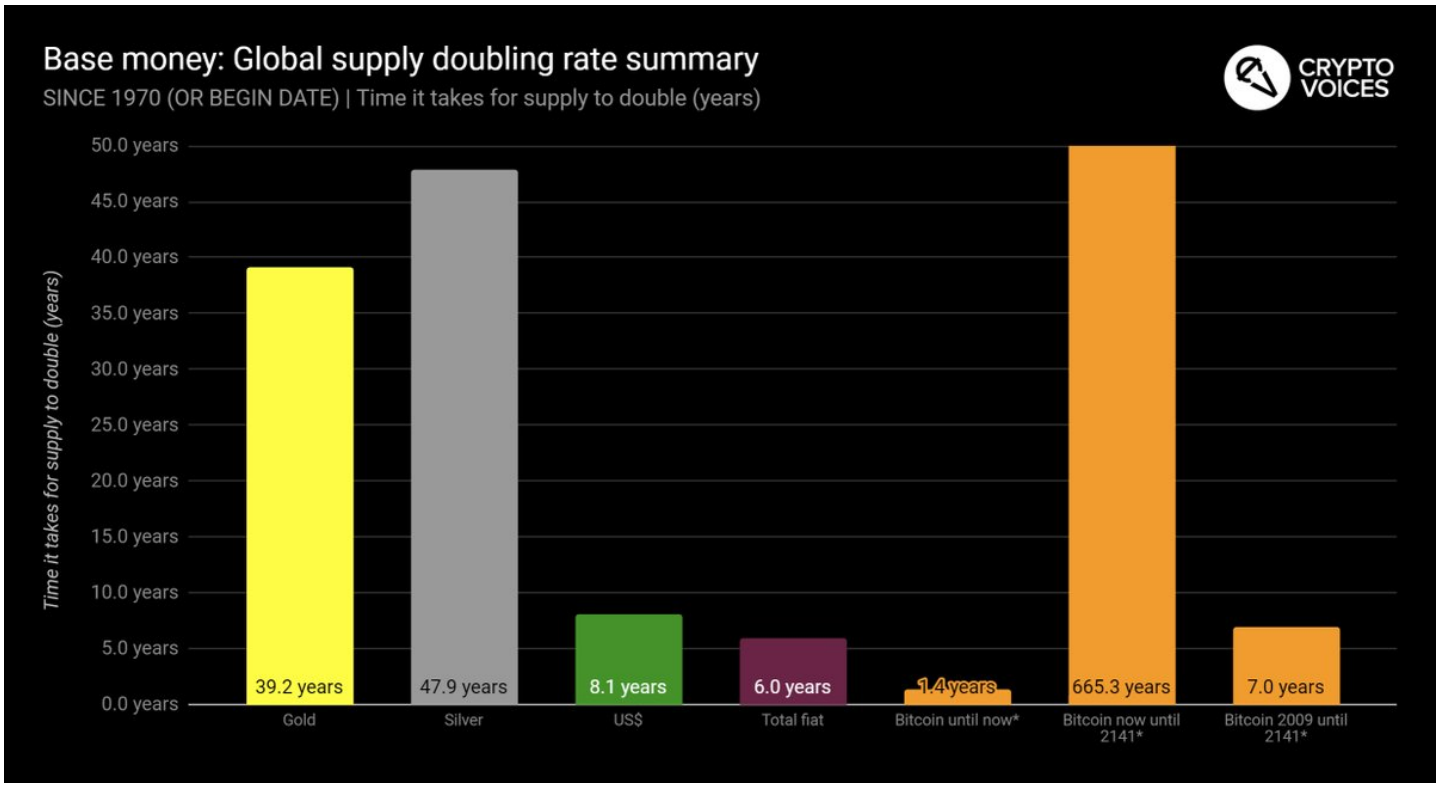


34/ It should be clear why gold and silver arose as past base money. 'Twas difficult to inflate them, and thus with low inflation rates they had long supply-doubling times (scarcity). Fiat base money has typically been much quicker to double. Bitcoin... needs more explanation.

35/ These next 2 charts will make it easier to understand how Bitcoin's supply works. From 2009 until now, yes, 50 bitcoins grew to 18.5 million. That's a ~65% compound annual growth rate, or doubling every 1.4 years. But, from now until 2141… that's when things get interesting.

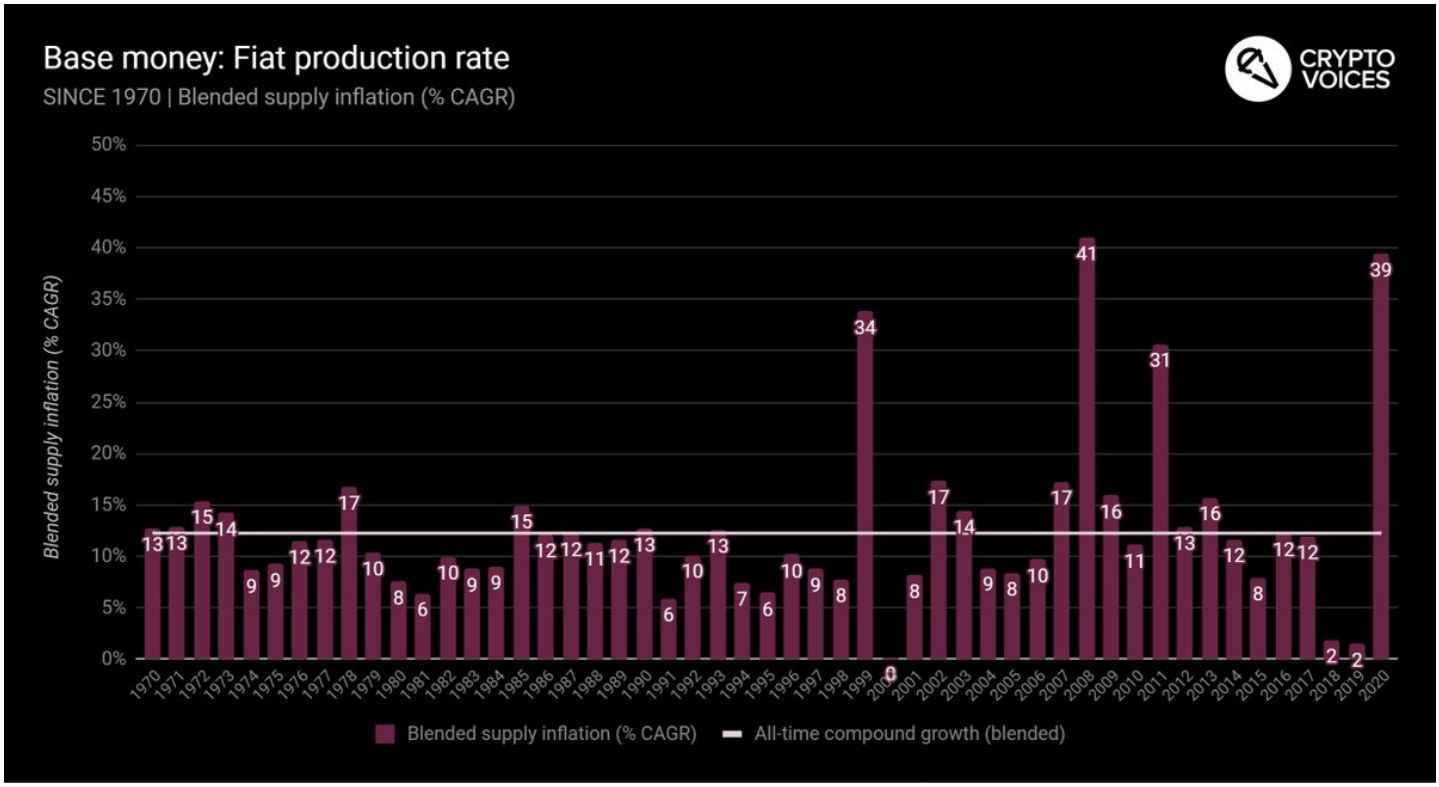


36/ Notice how the supply of bitcoins will only grow at 0.1% per year, or double every *665 years*. And it gets even more unique, as the Bitcoin protocol won't allow that doubling to happen, as it's supply will cap at 21 million in 2141. No money in history has worked like this.



37/ To clarify, this is the long-term compounding of past, present, & possibly future base money, since 1970:
Gold: 1.8% (39 yr-doubling)
Silver: 1.5% (48 yr-doubling)
US$: 8.9% (8 yr-doubling)
Global fiat: 12.3% (6 yr-doubling)
Bitcoin: From now until 2141: 0.1%... compounded.

38/ Back to the 50 year time series again, and this is the big one. Here is the global fiat base money inflation rate, weighted averaged by each base money's equivalent in US$. Notice it matches the overall 12.3% CAGR (6 year doubling time) we've already seen.

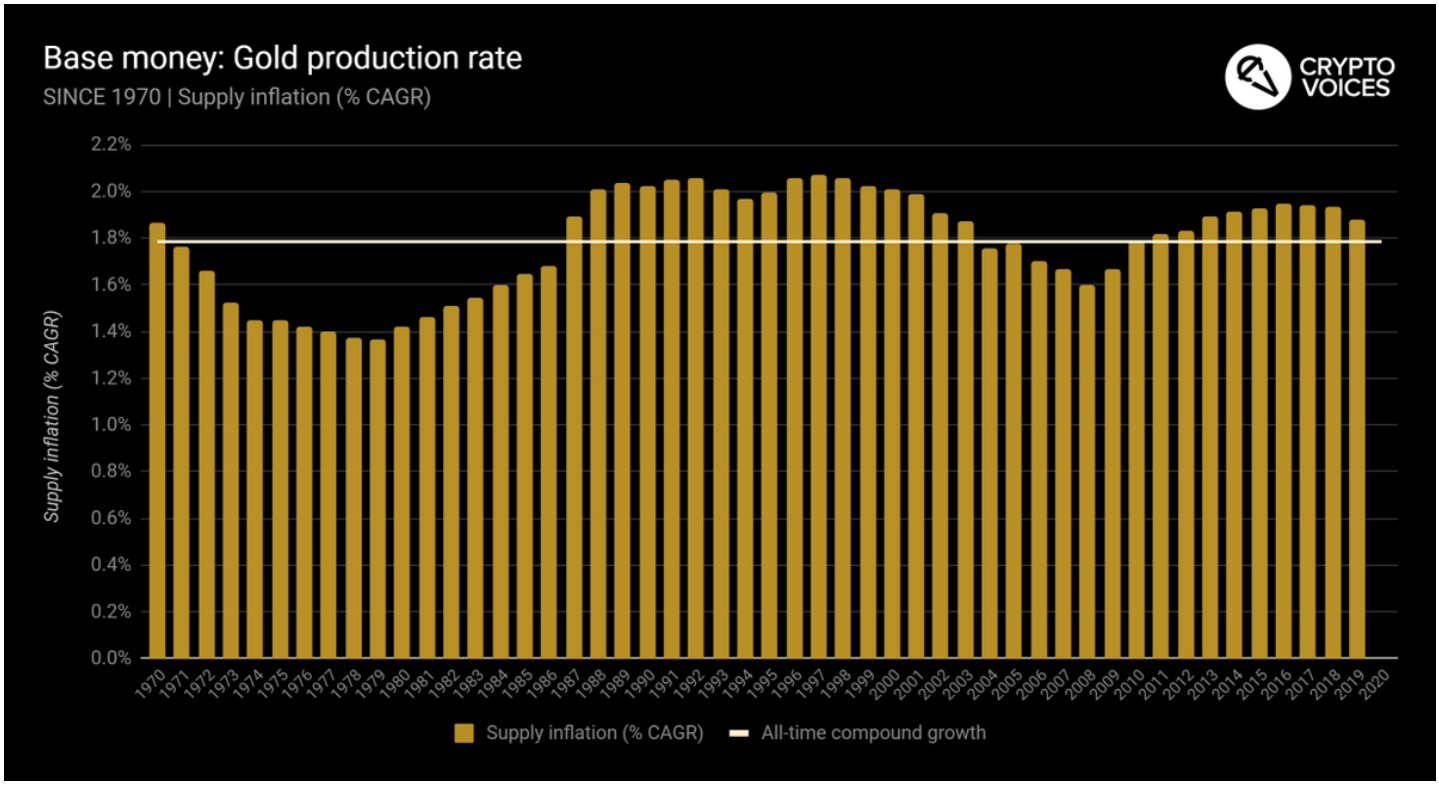


39/ Quick note on prior slide. What happened in 1999? People were taking cash out like mad before Y2K. Interesting to note, 2018 and 2019's inflation rates are in fact the lowest rates of growth of basic money ever, besides 1999. And we should say a few more words on this…

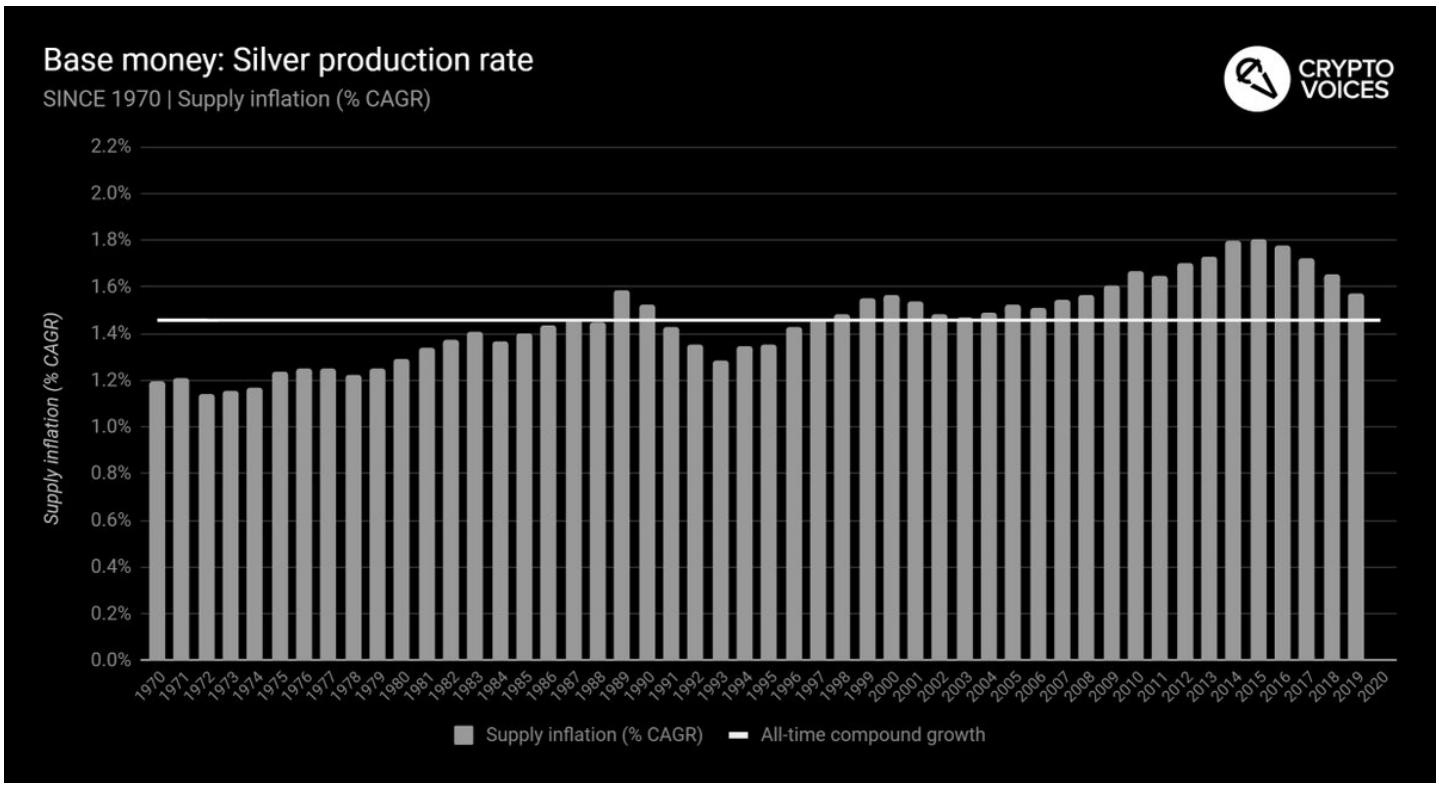
40/ For all 2019, central banks were actually on track to *deflate* their currencies. This would have been a first in the modern fiat era. So interestingly, no matter "why" one argues for money printing, 2019 still did finish off with positive inflation, weighted at 1.5%.

41/ Now here's the big one. How much money around the world is actually being printed? This exhibit is the one to answer that pivotal question: 2020 is now at historically record levels. Through Q3 2020, we're at 39% annualized. 2008 was highest ever at 41%. ■

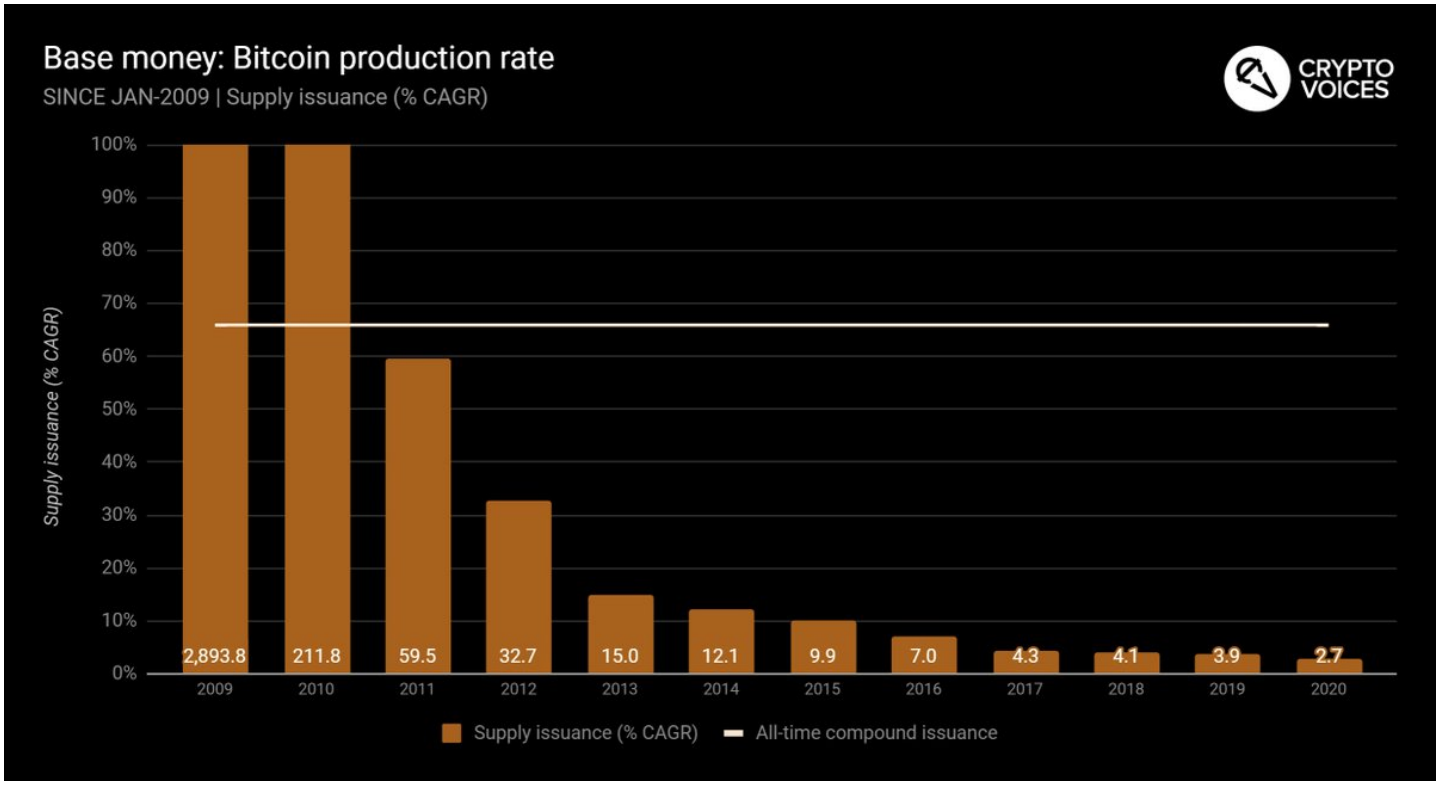
42/ Here's gold. Same concept. Notice again the overall series compounding will match the summaries we've already seen. Gold's rate of growth has, in fact, been around 1.8% per annum for the last 170 years.



43/ And here's silver. Same deal.



44/ And now Bitcoin. Remember why the overall compound growth, thus far, is so high, and why it will never be that high again. And now is about the time for a clarification note on the Bitcoin system's compound annual growth rate, specifically.



45/ Also notice the phrase "supply issuance" for Bitcoin's chart titles, and not "inflation." Bitcoin's "inflation," economically, is already baked in. Everyone knows its max supply. As already demonstrated, its growth rate is known until 2141, per the protocol.

46/ So when it comes to bitcoins, "inflation" is not the best term. "Coin issuance" is more apropos, as its overall supply is fixed and known. As our first podcast guest George Selgin said, "We know it's 21 million, and that's that." This is uniquely unlike fiat, or even gold...

47/ Lets take another detour on supply growth, also on the concept of "stock to flow." The attached exhibits cover all the main stock categories: all-time production, "available" supply, and "monetary metal" supply. These categories are often quoted inconsistently.

EXHIBIT 1

ALL-TIME UNITS (long-term horizon)

COMPOUND ANNUAL GROWTH	Gold	Silver	US dollar	Global fiat	Bitcoin	Formula	Description
Stocks below represent	*All-time production*	*All-time production*	*Monetary base*	*Monetary base*	*All-time issuance*		*Gold & silver: all-time, cumulative metal mined; US$ and global fiat: Total monetary base (physical currency + commercial bank reserves); Bitcoin: all-time, cumulative bitcoins mined.*
Begin date	31-Dec-1969	31-Dec-1969	31-Dec-1969	31-Dec-1969	3-Jan-2009		Bitcoin: Genesis block; all others: Start of 1970s (approximate closing of gold window).
Begin "all-time" stock	2.5 billion oz.	25.9 billion oz.	$0.1 trillion	$18.9 trillion	฿50		
Latest date	31-Dec-2019	31-Dec-2019	30-Sep-2020	30-Sep-2020	2-Nov-2020		Latest date analyzed.
Latest "all-time" stock	6.0 billion oz.	53.4 billion oz.	$4.9 trillion	$25.0 trillion	฿18.5 million		Latest stock analyzed.
Compound annual growth rate	**1.8%**	**1.5%**	**8.9%**	**12.3%**	**65.9%**	= ((1+r)^12)-1	Where r is average monthly growth rate since "Begin date." This is the "strongest" and most useful figure of an asset's long-term growth. Note with Bitcoin, we know the protocol's coin issuance will never again be as fast as it was in early years.
Compound stock to flow	**56.0**	**68.6**	**11.2**	**8.1**	**1.5**	= 1 / Compound annual growth rate	This is, in fact, the "strongest" stock to flow figure, as it reflects cumulative, annualized, long-term growth since "Begin date" (Genesis block with Bitcoin; Dec-1969 for all others). It truly represents how many years it took the all-time supply to double. Note again Bitcoin is unique here, as we know the protocol's issuance will never again be as fast as it was in early years.

Source: Gold & silver from industry expert Nick Laird; US$ from Federal Reserve; Global fiat from remaining central banks; Bitcoin from Coin Metrics.



EXHIBIT 2

ALL-TIME UNITS (1-year horizon)

LATEST ANNUAL GROWTH	Gold	Silver	US dollar	Global fiat	Bitcoin	Formula	Description
Stocks below represent	*All-time production*	*All-time production*	*Monetary base*	*Monetary base*	*All-time issuance*		*Gold & silver: all-time, cumulative metal mined; US$ and global fiat: Total monetary base (physical currency + commercial bank reserves); Bitcoin: all-time, cumulative bitcoins mined.*
TTM date	31-Dec-2018	31-Dec-2018	30-Sep-2019	30-Sep-2019	2-Nov-2019		Means date "trailing twelve months" before Latest date.
TTM "all-time" stock	5.9 billion oz.	52.6 billion oz.	$3.2 trillion	$18.9 trillion	฿18.0 million		Means stock "trailing twelve months" before Latest stock.
Latest date	31-Dec-2019	31-Dec-2019	30-Sep-2020	30-Sep-2020	2-Nov-2020		Latest date analyzed.
Latest "all-time" stock	6.0 billion oz.	53.4 billion oz.	$4.9 trillion	$25.0 trillion	฿18.5 million		Latest stock analyzed.
Latest annual "new" flow	**0.11 billion oz.**	**0.83 billion oz.**	**$1.68 trillion**	**$6.14 trillion**	**฿0.51 million**	= Latest stock - TTM stock	The latest, estimated (actual in Bitcoin's case), gross annual supply change for all use cases of metal (industrial, jewelry, coins & bars), fiat currency, and bitcoin. With gold, silver, & Bitcoin, this figure is analogous to annual mine production.
Latest annual growth rate	**1.9%**	**1.6%**	**52.4%**	**35.2%**	**2.8%**	= Latest stock / TTM stock - 1	Latest annual growth rate of all-time supply since TTM date. Most useful figure when comparing assets across short-term data. Note how both gold & silver's Latest annual growth rates are quite consistent with their long-term CAGRs (Exhibit 1). Note again with Bitcoin, as we know the protocol's issuance will never again be as fast as it was in early years, this figure is arguably more important than its long-term CAGR (again, Exhibit 1).
Latest stock to flow	**53.3**	**63.5**	**1.9**	**2.8**	**35.6**	= 1 / Latest annual growth rate (or TTM stock / Latest annual flow)	Simply inverse of above formula. This is the only stock to flow methodology consistent with the Latest annual growth rate calculation directly above.

Source: Gold & silver from industry expert Nick Laird; US$ from Federal Reserve; Global fiat from remaining central banks; Bitcoin from Coin Metrics.



EXHIBIT 3

"AVAILABLE" UNITS (1-year horizon)

LATEST ANNUAL GROWTH	Gold	Silver	US dollar	Global fiat	Bitcoin	Formula	Description
Stocks below represent	*Jewelry, coins, & bars*	*Jewelry, coins, & bars*	*N/A*	*N/A*	*Bitcoins not lost / burned*		*Gold & silver: all-time, cumulative metal mined, less industrial metal and metal presumed lost; US$ and global fiat: Not applicable; Bitcoin: all-time, cumulative bitcoins mined, less bitcoins (constant 20%) presumed lost.*
TTM date	31-Dec-2018	31-Dec-2018			2-Nov-2019		Means date "trailing twelve months" before Latest date.
TTM "available" stock	5.2 billion oz.	27.0 billion oz.			฿14.4 million		Means stock "trailing twelve months" before Latest stock.
Latest date	31-Dec-2019	31-Dec-2019			2-Nov-2020		Latest date analyzed.
Latest "available" stock	5.3 billion oz.	27.4 billion oz.			฿14.8 million		Latest stock analyzed.
Latest annual "available" flow	**0.09 billion oz.**	**0.31 billion oz.**			**฿0.40 million**	= Latest stock - TTM stock	The latest, estimated, net annual supply change of "available" metal (jewelry, coins & bars) and bitcoin. Note that with gold & silver, particular supply and demand factors must be included in this calculation, such as recycled metal (scrap), treasury sales, and fabrication demand. With bitcoin, the loss rate assumed is a constant 20% discount from all-time figures. Category not applicable to fiat currency.
Latest annual growth rate	**1.8%**	**1.1%**			**2.8%**	= Latest stock / TTM stock - 1	Latest annual growth rate of "available" supply since TTM date. Most useful figure when comparing assets across short-term data. Note how both gold & silver's Latest annual growth rates are quite consistent with their long-term CAGRs (Exhibit 1). Note again with Bitcoin, as we know the protocol's issuance will never again be as fast as it was in early years, this figure is arguably more important than its long-term CAGR (again, Exhibit 1).
Latest stock to flow	**54.7**	**87.6**			**35.6**	= 1 / Latest annual growth rate (or TTM stock / Latest annual flow)	Simply inverse of above formula. This is the only stock to flow methodology consistent with the Latest annual growth rate calculation directly above.
"Discounted" stock to "New" flow	**46.4**	**32.6**			**28.5**	= TTM stock / Latest annual "new" flow from mine production (Exhibit 2)	Here we arrive at an alternate stock to flow calculation. This formula does not have any basis in the economic reality of supply and demand **in this particular category of "available" supply**. The formula takes the same "discounted" stock of available supply as directly above, but instead of using the corresponding net change (net available flow) in the denominator, the formula uses the "full flow" of new metal and bitcoin (in other words, mine production, used in Exhibit 2).

Source: Gold & silver from industry expert Nick Laird; US$ from Federal Reserve; Global fiat from remaining central banks; Bitcoin from Coin Metrics.



EXHIBIT 4

"MONETARY METAL" UNITS (1-year horizon)

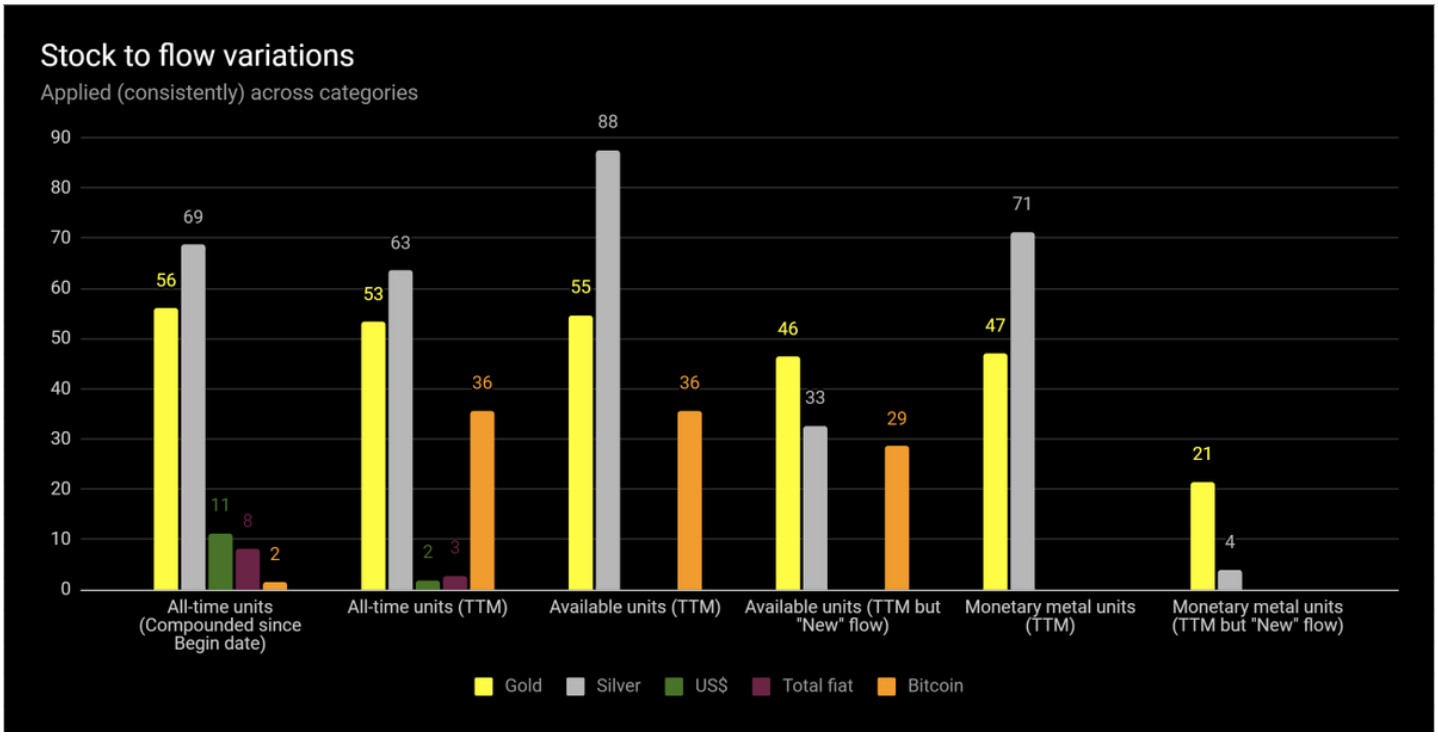
LATEST ANNUAL GROWTH	Gold	Silver	US dollar	Global fiat	Bitcoin	Formula	Description
Stocks below represent	*Coins & Bars*	*Coins & Bars*	*N/A*	*N/A*	*N/A*		*Gold & silver: estimated metal in bullion (coins & bars) form; US$ and global fiat: Not applicable; Bitcoin: Not applicable.*
TTM date	31-Dec-2018	31-Dec-2018					TTM means "trailing twelve month(s)."
TTM stock	2.4 billion oz.	3.2 billion oz.					TTM means "trailing twelve month(s)."
Latest date	31-Dec-2019	31-Dec-2019					Latest date analyzed.
Latest stock	2.4 billion oz.	3.3 billion oz.					Latest stock analyzed.
Latest annual "monetary" flow	**0.05 billion oz.**	**0.05 billion oz.**				= Latest stock - TTM stock	The latest, estimated, net annual supply change of "monetary" metal (coins & bars). Note that particular supply and demand factors must be included in this calculation, such as recycled metal (scrap), treasury sales, and fabrication demand. Category not applicable to fiat currency and Bitcoin.
Latest annual growth rate	**2.1%**	**1.4%**				= Latest stock / TTM stock - 1	Latest annual growth rate of "monetary" supply since TTM date. Most useful figure when comparing assets across short-term data. Note how both gold & silver's Latest annual growth rates are quite consistent with their long-term CAGRs (Exhibit 1).
Latest stock to flow	**47.0**	**71.3**				= 1 / Latest annual growth rate (or TTM stock / Latest annual flow)	Simply inverse of above formula. This is the only stock to flow methodology consistent with the Latest annual growth rate calculation directly above.
"Discounted" stock to "New" flow	**21.4**	**3.9**				= TTM stock / Latest annual "new" flow from mine production (Exhibit 2)	Here we arrive at an alternate stock to flow calculation. This formula does not have any basis in the economic reality of supply and demand **in this particular category of "monetary" supply**. The formula takes the same "discounted" stock of monetary supply as directly above, but instead of using the corresponding net change (monetary flow) in the denominator, the formula uses the "full flow" of new metal (in other words, mine production, used in Exhibit 2).

Source: Gold & silver from industry expert Nick Laird; US$ from Federal Reserve; Global fiat from remaining central banks; Bitcoin from Coin Metrics.



48/ Remember, consistency. Gold bugs first: They often claim silver's S2F is 3 or 4. If you're a gold bug and really want to disparage silver with this (closer to 4) ratio, then you should in the same breath quote gold's comparable S2F in this

(spurious) category: 21.



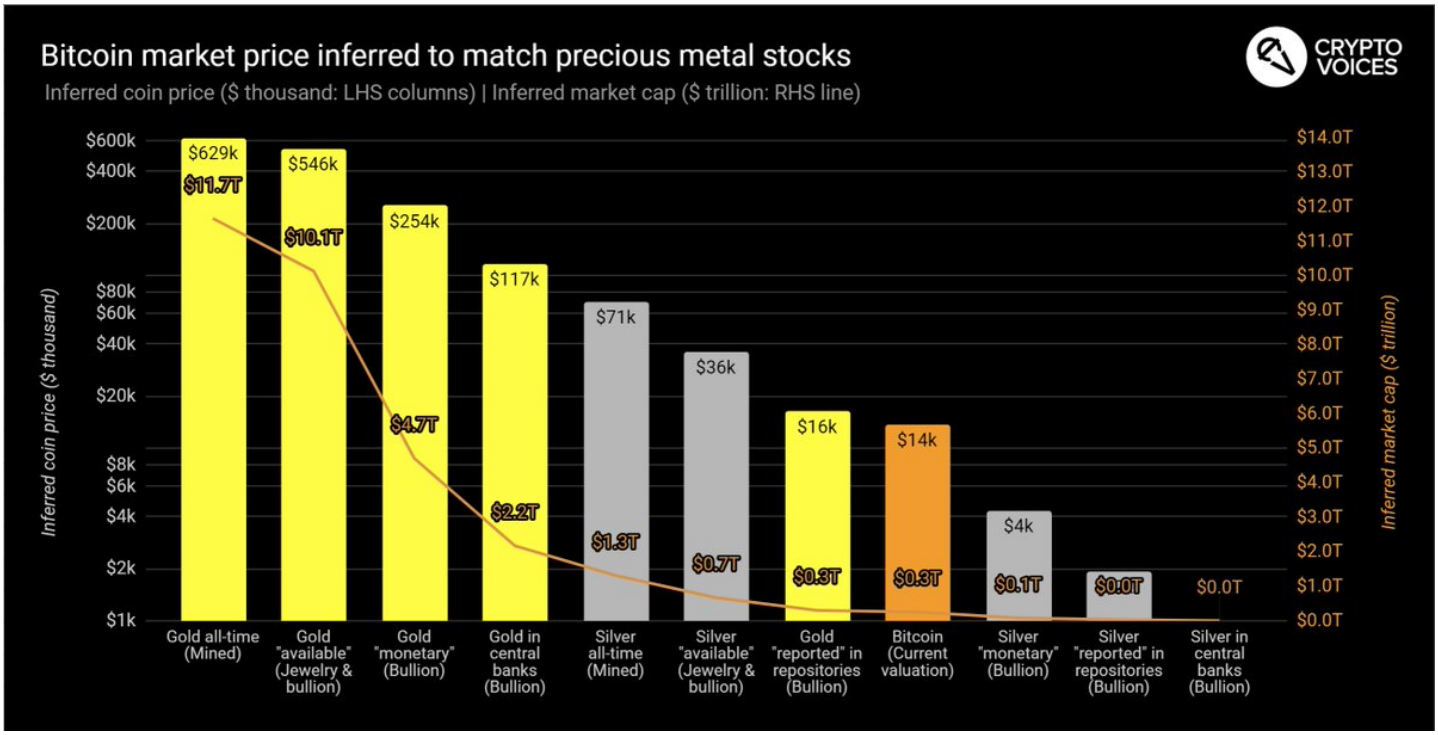
49/ Now for silver bugs. For years, as gold's price is ~80x silver's, they've claimed silver's price is due for at least a 5x move, to bring it back in line with the historical, natural ratio to gold (about 16 to 1). There are a few problems with this.

50/ First, it's impossible to predict price based on historical supply and demand ratios. Second, even if we assumed that historical ratio of 16 to 1 was gospel, silver is *already* at that level. You just need to view it through the correct lens…

51/ The all-time gold *stock* is $11.7T; silver is $1.3T. Ratio of 9. Holding gold constant, silver's price needs to *fall* 44% to get to the 16x ratio! Repeat this process across "available" metal ($10T gold and $0.7T silver), then it's only a -5% move in silver price.

Done.

52/ One more thing. Let's look bird's eye across all gold & silver groups. Of all the "transparent," reported repositories of bullion (calculated by Nick Laird) - all ETFs, the Perth mint, even @PeterSchiff's GoldMoney, etc. - #bitcoin has passed silver & it's very close to gold.



53/ Alright. Now that we've seen all the data, let's finally take a quick look at some price chat, because even though I told you none of the above covers prices, I know you're thinking about how all of this monetary inflation has affected or will affect prices.

54/ Milton Friedman said, "Inflation is always and everywhere a monetary phenomenon." He meant price inflation (not graphed above) always and everywhere follows money inflation (very much graphed above).

55/ The rub is it is impossible to predict how and when price inflation will happen. Impossible to predict. Hyperinflations (of prices) or otherwise. The best we can do is measure the money supply and its growth, as we've done here.

56/ But we can say this: If the supply of base money increases, and if there is no or a lesser increase in the demand for that money, then ceteris paribus, prices will rise. Ceteris paribus, a growing base money supply will always undermine that money's purchasing power.

57/ These are some of the reasons why the market chose hard money like gold & silver. Always emergent in human action, unless there is monopoly intervention (fiat), the market will decide the best money. If aliens in a one-off whisked away our gold, we'd choose the next best...

58/ A few notes before the final summary. Almost done! Remember these are the top 30 currencies in the world over the past 50 years. Zimbabwe & Belarus don't make the cut; as their monetary base is so tiny, their hyperinflations would barely move the needle on what's presented.

59/ For the euro, its accounting creation began in 1999, and it started circulating in 2002. Prior to 2002, we are building a blended monetary base for the euro back to 1970, and as of now, include 3 of the very largest: the Deutsch mark, the French franc, and the Italian lira.

60/ To be absolutely clear on the global fiat blended inflation rate: it's calculated using a weighted factor of each country's base money supply, based on how large their US$ equivalent actually is, during that month. This weight evolves as more currencies are added.

61/ As we look back in time, for those currencies that weren't established, they didn't factor into that period's global inflation. For example, the US dollar's weight itself was 40% of the pie in 1970, and only 20% today, as (among others), data on China begins only in Dec-1999.

62/ Regarding compound annual growth rates: they're always calculated from monthly fiat unit growth, then compounded to annual (to the 12th exponent). This is necessary due to cases like Brazil and Argentina, which had 6 and 4 different currencies respectively, since 1970 alone.

63/ Continuing, a compound annual growth rate from a 1970 currency to 2020 currency doesn't make sense for Brazil. So the *monthly* rate must be taken across time and then compounded, ignoring those 6 months when the central bank reset (slashed zeroes) from the old currency.

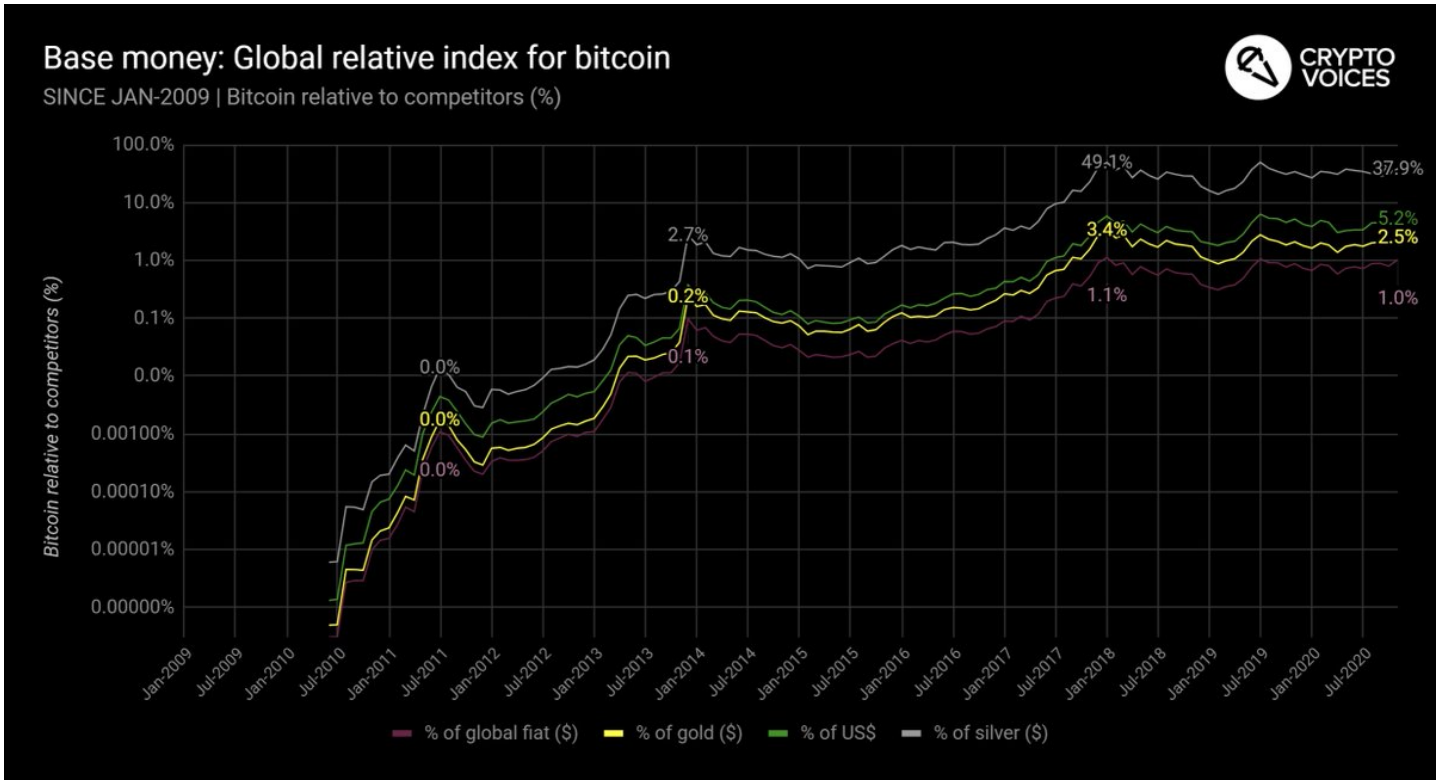
64/ And finally, the mechanics of this method (compounding monthly growth rates to annual) were of course repeated across gold, silver, and bitcoin's supply curves, for consistency.

65/ On our podcast @crypto_voices, @fernandoulrich and I explore the varying economic nuances of Bitcoin as a contender for the global monetary base, for global money.

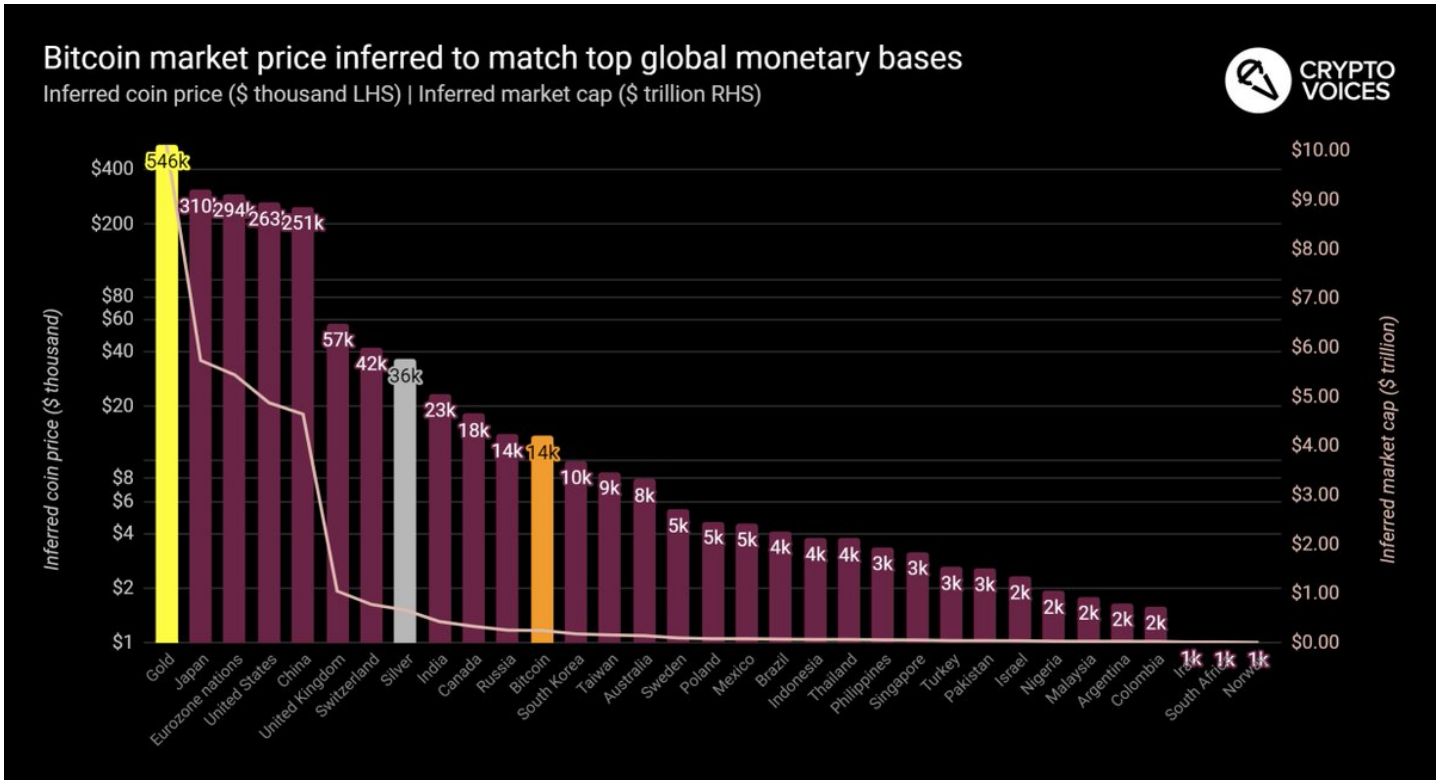
66/ To sum up, this graphic includes all items. Print it out if you like. The base money of 113 nations is reflected inside the top 30 currencies, and it summarizes gold, silver, and the supply of bitcoins. It is a supply-side summary of essentially all basic money in the world.

67/ Head over to https://t.co/I5lXV9MMM6 or https://t.co/UgTHz0uQs1 to learn more. Fiat base money is sourced from central bank balance sheets, wonderful gold and silver history from industry expert Nick Laird, and bitcoin from @coinmetrics.

68/ These penultimate graphics illustrate how Bitcoin's supply (US$ equivalent) compares across all other basic monies, past and present. Bitcoin sits at 1%. The #RealBitcoinDominanceIndex.



69/ And finally, one might be curious as to what price it will take for #bitcoin to surpass each nation's monetary base value (including the gold and silver "available" caps). Again with the definite caveat that these are calculations, not predictions… that chart is here.



70/ More to come in the future. We are continuing to work on this topic. Any sats you might spare to contribute are very much appreciated, and will help keep up the research!

Tips in $BTC preferred and can be made here: https://t.co/xyvl2bjKIs

/fin