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The Quantity Theory of Money (the Equation of Exchange): The Expansion of the Money Supply, the Decline in Velocity and the Potential Impact of its Reversion on the General Level of Prices - 2021 Reprisal

While quiescent for decades, inflation is now the topic of the day, given its rapid recent ascent and pundits' debates over its (undefined) transitory nature. In 2017, we compiled our thoughts directed at the relationship between the money supply and inflation, given the recent explosion in the former and the declining nature of the latter. In our 2017 paper, we attempted to quantify the risk of a rising money supply and inflation using the Quantity Theory of Money, a theory that is centuries old and serves as the foundation of the well-documented Equation of Exchange. The theory supports the idea that the price level is directly influenced by (1) the money supply, (2) the real value of economic output and (3) velocity (the average frequency across all transactions with which a unit of money is spent). Specifically, the equation of exchange is represented by the following identity:

$MV = PQ$, where:

M = the money supply (often times represented by the Federal Reserve's definition of "M2", which includes: (1) currency outside the U.S. Treasury, Federal Reserve Banks and the vaults of depository institutions; (2) demand deposits at commercial banks (excluding those amounts held by depository institutions, the U.S. government and foreign banks and official institutions) less cash items in the process of collection and Federal Reserve float; (3) other liquid deposits, consisting of other checkable deposits and savings deposits (including money market deposit accounts); (4) small-denomination time deposits (time deposits in amounts of less than $100,000) less IRA and Keogh balances at depository institutions; and (5) balances in retail money market funds (MMFs) less IRA and Keogh balances at MMFs);

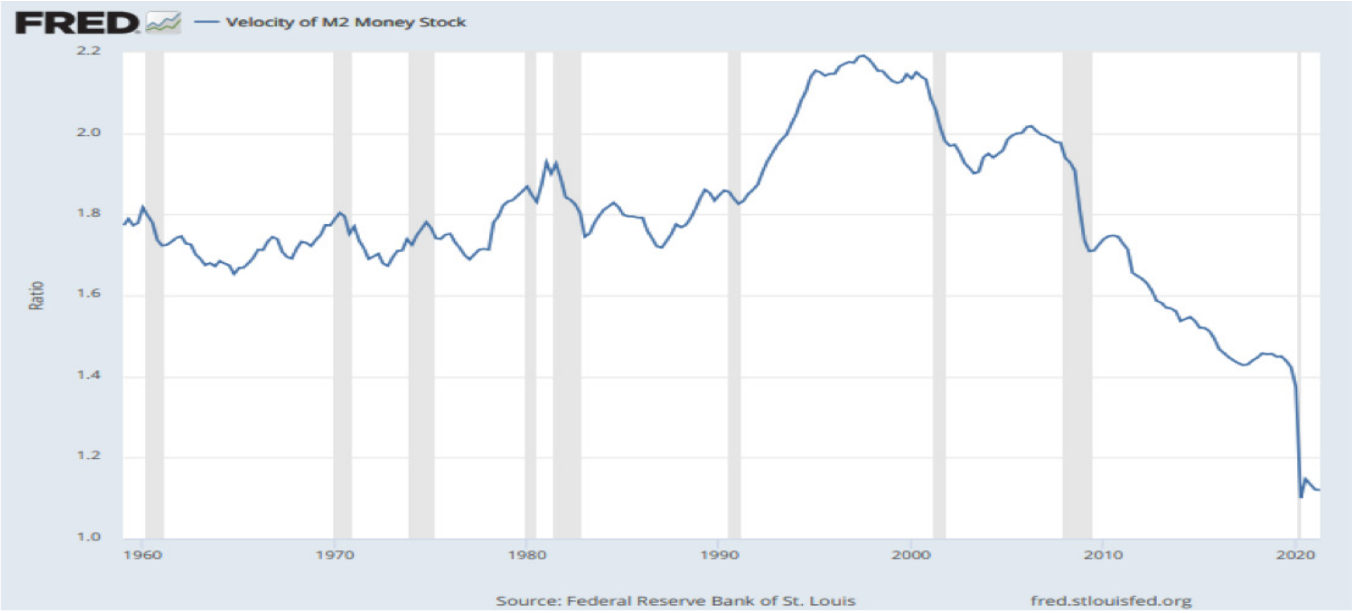
V = the velocity of money;

P = the price level associated with transactions for an economy (a proxy for inflation); and

Q = the real value of economic output

The identity's underpinnings lie in the intuition that nominal economic output is a function of the money supply and the frequency with which money is spent. In our 2017 paper, we remarked that while defining M, P and Q appears to be straightforward, the notion of V is more abstract. That is, how does one determine how often a unit of money is "spent"? Certainly, you could solve for V if M, P and Q are known, but the measure should have intuitive meaning on its own. Perhaps the best alternative explanation of velocity lies in the interpretation of a directional movement. That is, a decline in velocity means that investors are hoarding money instead of spending. Over the past fourteen years, we have witnessed velocity decline, perhaps as a function of an uncertain economic environment coinciding with the Federal Reserve's push to lower interest rates via conventional and unconventional means. Velocity's wicked turn lower induced by COVID-19 prompted us to update our thoughts surrounding the potential price level implications of a snapback higher. As can be seen from the chart below, the current level of velocity stands markedly lower than those experienced in prior periods:

CHART 1 - The Velocity of M2 Money Supply (gray columns denote recessions)



Source: Federal Reserve Bank of St. Louis

In 2017, we commented on periods of rising and falling velocity and its association with confidence variability, including the rise in velocity during most of the 1990s (rising productivity, rising confidence), a fall associated with the dot-com breakdown in the early '00s, the subsequent rise in conjunction with the housing mania in the mid '00s, and the precipitous fall in alignment with the Great Recession and beyond. As can be seen above, COVID-19 has created an even more pronounced and abrupt decline in velocity. Overall, the mean velocity dating back to 1959 is 1.74x with a standard deviation (σ) of 0.201x. The year-end 2020 reading of 1.09x is a low point for the time period by a significant margin. In fact, a velocity reading of 1.09x is over 3σ from the period's mean. Perhaps we should not be surprised that the onset of the worst global pandemic in a century has caused a data point that is likely to occur less than 1% of the time (assuming a normal distribution of outcomes). However, the 2020 velocity calculation could likely prove to be an outlier, driven by the impact of COVID-19 on both consumer confidence and overall spending. After all, not only were consumers and corporations reigning in spending due to uncertainty about the future, but shutdowns also significantly limited the availability of goods and services. As was the case when we authored our 2017 paper, the question is, what might happen to inflation if velocity were to head back toward historical levels.

To do this, we examined a few scenarios. In the first scenario, much like our 2017 whitepaper, we aimed to evaluate what might happen to inflation (via P in the Equation of Exchange) if velocity were to revert to its mean in a slow and steady fashion. To decide how long that might take, we averaged the absolute value of the annual change in V since 1959; the result was 0.046x. Beginning with 2020's value of 1.09x and increasing V by 0.046x each year, we calculate that under these assumptions it would take nearly 14 years to return to the long-term average Velocity of 1.74. This is much longer than the 8-9 years we calculated when running the same calculation four years ago. For the next step, we forecasted both Q and M at the rate at which they have grown, on average, over the last 61 years. That is, we grew M at just over 7% annually and increased Q 2.9% per year. Finally, we used the Equation of Exchange to solve for P, the Price level, thus deriving an estimate for inflation. The results are shown in the table below:

TABLE 1 - One Potential Course for Inflation Using the Equation of Exchange

	M' ($b)	Q' ($b)*	V'	P'	Inflation**
2020	$ 19,131	$ 18,426	1.09	1.14	
2021	$ 20,483	$ 18,965	1.14	1.23	8.4%
2022	$ 21,929	$ 19,519	1.19	1.33	8.2%
2023	$ 23,478	$ 20,090	1.23	1.44	8.1%
2024	$ 25,136	$ 20,677	1.28	1.56	7.9%
2025	$ 26,911	$ 21,281	1.33	1.68	7.8%
2026	$ 28,811	$ 21,903	1.37	1.80	7.7%
2027	$ 30,846	$ 22,544	1.42	1.94	7.5%
2028	$ 33,025	$ 23,202	1.46	2.08	7.4%
2029	$ 35,357	$ 23,881	1.51	2.24	7.3%
2030	$ 37,854	$ 24,579	1.56	2.40	7.2%
2031	$ 40,527	$ 25,297	1.60	2.57	7.1%
2032	$ 43,389	$ 26,036	1.65	2.75	7.0%
2033	$ 46,454	$ 26,797	1.70	2.94	6.9%
2034	$ 49,734	$ 27,581	1.74	3.14	6.9%
				Average	7.5%

Source: www.bea.gov; www.federalreserve.gov
Note: The ', or prime, symbol implies a potential future value using historical growth rates, beginning in 2021. 2020 is actual data.
**Chained 2012 dollars*
***Inflation is calculated as the year-over-year percent change in the price level (P). P is an index based on 2012 dollars.*

As shown in Table 1, the average inflation rate over the time period required to balance the equation of exchange under these assumptions comes out to 7.5%, beginning above 8% and tempering throughout the analysis. This is not only well above the 1.2% increase in consumer prices last year, but more than double the average rate of inflation since 1959 (3.68%). In fact, the last year in which we saw inflation at levels at or above the 7.5% was in 1981.

Given the precipitous decline in velocity during 2020, it seems reasonable to think that we might see a snapback in V over the coming quarters and years. As such, we then examined a scenario that encompassed this possibility, the effects of which are shown in Table 2. In doing so, we decided to ramp up velocity to 2019 levels (still a historically low value of 1.4x) by 2022. In this scenario, inflation could jump into the high teens in the next two years, *all else equal*, with a reduction into the single digits thereafter, assuming a more ratable increase towards the long-term average at the end of the decade.

TABLE 2 - A Snap Back of Volatility's Effect on Potential Inflation

	M' ($b)	Q' ($b)*	V'	P'	Inflation**
2020	$ 19,131	$ 18,426	1.09	1.14	
2021	$ 20,483	$ 18,965	1.25	1.35	18.5%
2022	$ 21,929	$ 19,519	1.40	1.57	16.7%
2023	$ 23,478	$ 20,090	1.44	1.69	7.5%
2024	$ 25,136	$ 20,677	1.49	1.81	7.4%
2025	$ 26,911	$ 21,281	1.54	1.94	7.3%
2026	$ 28,811	$ 21,903	1.58	2.08	7.2%
2027	$ 30,846	$ 22,544	1.63	2.23	7.1%
2028	$ 33,025	$ 23,202	1.68	2.39	7.0%
2029	$ 35,357	$ 23,881	1.72	2.55	6.9%
2030	$ 37,854	$ 24,579	1.77	2.72	6.8%
				Average	9.2%

Source: www.bea.gov; www.federalreserve.gov
Note: The ', or prime, symbol implies a potential future value using historical growth rates, beginning in 2021. 2020 is actual data.
**Chained 2012 dollars*
*** Inflation is calculated as the year-over-year percent change in the price level (P). P is an index based on 2012 dollars.*

Inflationary environments can be difficult for bond investors, but are not necessarily bad for common stocks. For example, the correlation between inflation and the S&P 500 Index for the period 1979-2020 is 0.049, indicating no directional relationship. In fact, during the 4-year stretch of high inflation (1979-1982), the S&P 500 saw double-digit rates of return in 3 out of 4 years.

We want to be clear: the data shown above is not a prediction or our estimate of future rates of inflation. While an inflationary outlook had been a pronounced contrarian view in 2017, it is now mainstream/headline news today, but rarely for reasons cited above. Our views reflect applying a well-documented economic identity to the current economic environment. There are reasons why inflation may not reach a level anywhere near 7.5% over the next decade. Inflation was held in check in 2020 despite the drop in velocity, at least in part, because M2 was up 24.8% in 2020 vs. 2019. 2020 M2 is up 117% vs. a decade ago, and the above scenarios have it nearly doubling again this decade. The Fed plays an important role in this outcome and aggressive QE tapering and/or raising banks' reserve requirements, amongst other factors, could alter the path of projected M2 growth. We note, however, that M2 has never showcased negative year-over-year growth (using calendar years) since at least 1960, muting the possibility that moderate/flat growth in M2 can be an inflationary counterweight to a reverting velocity. In other words, a way to achieve the benign inflationary rates we had witnessed in 2020 and prior would be to hold M2 flat, an historical departure.

We exit our analysis by coming back to the somewhat cloudy concept of the velocity of money. Has there been a permanent change in public behavior amongst consumers and corporations? Is there a shift toward mounting a more conservative defense against future potential exogenous developments? Will the mere *anticipation* of future inflation drive velocity higher? The bottom line is that the recent year-over-year increases in the PCE deflator so far in 2021 have occurred in the absence of higher velocity; the potential amplification of higher prices associated with any velocity reversion has us convinced that investors are largely ignoring this dynamic.