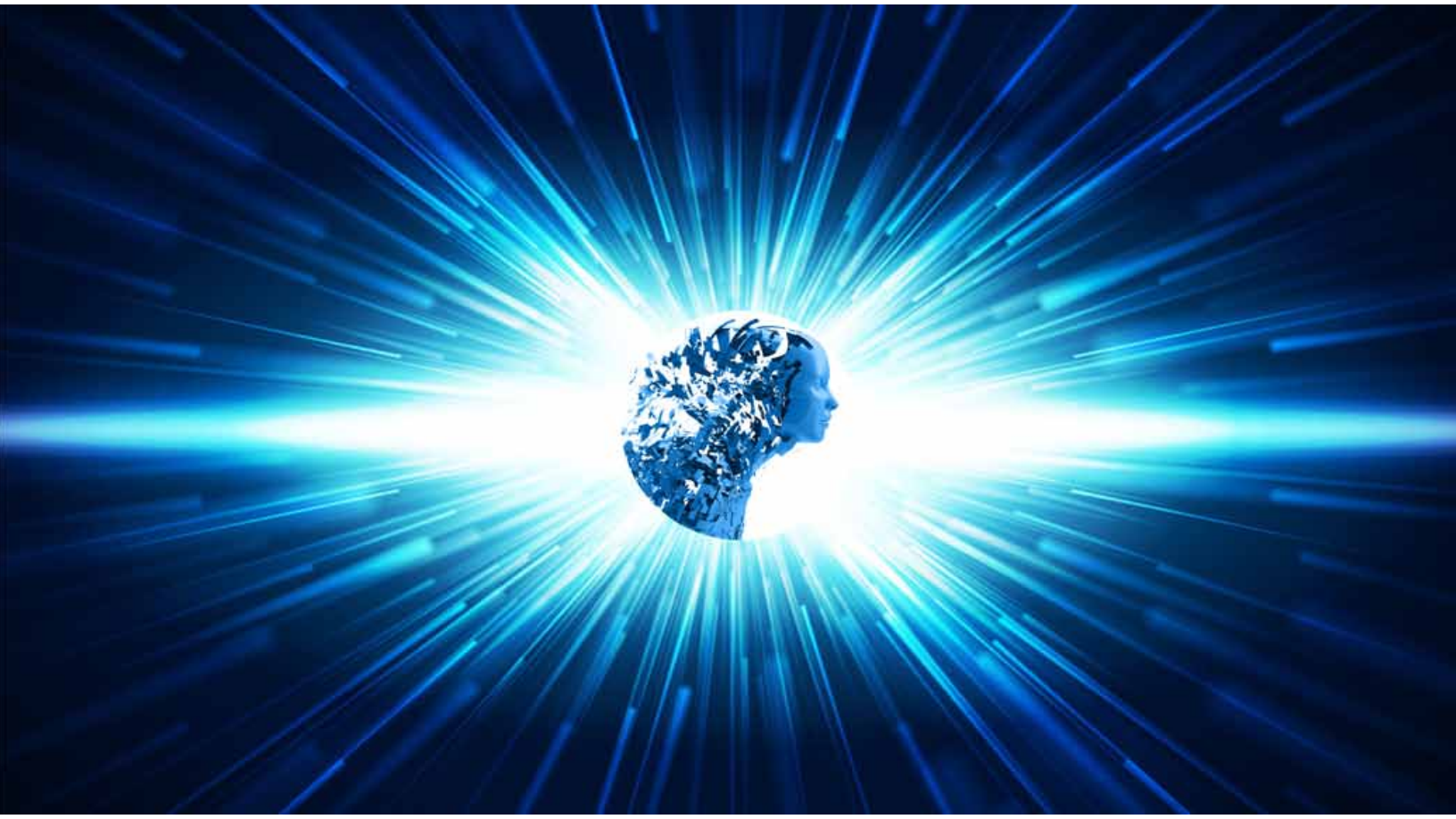
SPACE EXPLORATION AND MONEY MECHANICS

An Evolutionary Challenge

Armen Papazian



NOVEMBER 2012

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ABSTRACT

In order to invent, develop, and build the technology of space, now and in the future, we need billions and billions of dollars to finance a massive research, innovation, and development drive. I argue that humanity's space potential is closely tied to humanity's financial wisdom, such that travel into deep space may very well be possible after we have transformed our current money creation methodologies. Current money mechanics is founded on debt and credit. A debt based monetary architecture chains the species to calendar time payments, and thus makes the financing of space projects challenging given the time pattern of future expected cash flows and the immeasurable risks involved. In fact, interstellar travel poses a challenge to the very principles of financial valuation theory and practice, i.e., time value of money and risk and return. In other words, there is no identifiable discount rate for building starships. Thus, the creation of future space infrastructure may require some form of public debt-free financing. The recently announced 40 billion dollar monthly injections of new money by the Federal Reserve into the banking system are being executed via the purchase of mortgage backed securities from the banks. As the creators of money, we are and should be in a position to design and implement an alternative financial product, just as valid as a mortgage backed security, that will channel at least one of Fed's next monthly injections into space exploration and NASA. This is possible through Public Capitalization Notes, which facilitate debt free money injection into real projects. We may need to transform money mechanics before we can reach deep space, and Curiosity on Mars in the midst of a financial turmoil lights the path to human creativity.

Keywords: Space Exploration, Money Creation, Space Value of Money, Financial Valuation

WE ARE THE INVENTORS OF MONEY, AND OUR FINANCIAL IMAGINATION IS AS IMPORTANT AS OUR TECHNOLOGICAL IMAGINATION WHEN IT COMES TO EXTENDING OUR REACH INTO THE COSMOS.

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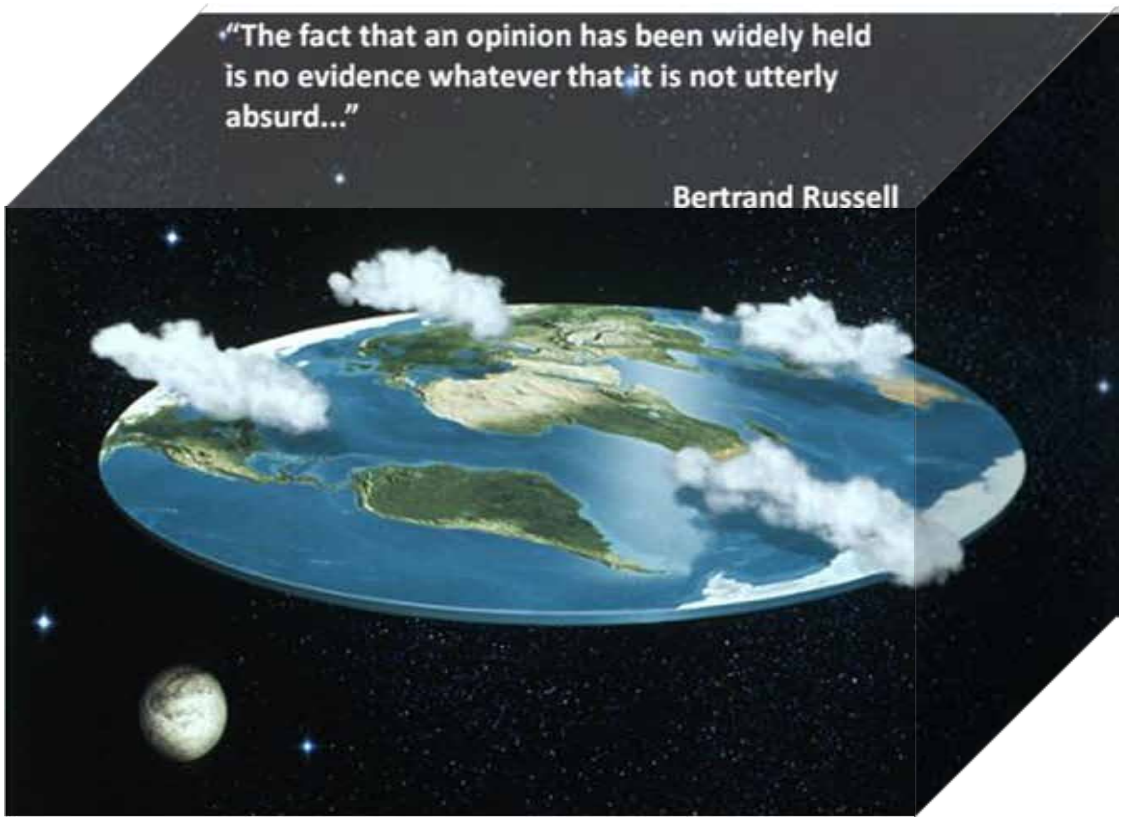

SPACE EXPLORATION AND MONEY MECHANICS

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Sometimes, we seriously underestimate the Universe we are in, like when we used to believe that the Earth is flat, or when we thought the Earth was the center of the Universe. Today, the species is at a crossroad. Our monetary architecture, or the way we create money on Earth, is proving to be a serious evolutionary obstacle, depicting a misconception similar in magnitude to the ones mentioned above.

Money creation is founded on a logic of debt, and our economic and financial principles are grounded in scarcity, time, and risk. The vastness of space and the abundance of a galactic reality escapes our models.

I argue that humanity's space potential is tied to humanity's financial imagination and wisdom. As we create money via debt, we bound the species to calendar time, and stall the expansion into space, given the risks and time pattern of expected cash flows from space related projects.

Space involves risks and cash flow expectations that defy the laws of finance. Intergenerational returns and immeasurable risks pose a serious challenge to financial valuation and debt-based money creation.

Money mechanics, today, is the single most tenacious obstacle to our future in space, far outweighing the scientific and technological challenges, where human imagination has already managed a moon landing and a Mars landing. Curiosity on Mars in the middle of a financial turmoil lights the path to human creativity, and proves the extent and reach of our creative abilities.

Budget cuts, austerity measures, and sovereign debt crises are policy reactions that indicate the inability of financial and monetary structures to think prosperity, victim to a self-designed debt-based system.

We are the inventors of money, and we should know and recognize and accept improvements in the process of money creation, just as we expect and allow improvements in our understanding of sub atomic particles, or the quality and features of our latest technological gadget.

Our ability to create and unlock the resources we need for space exploration are directly linked to the way we create money on Earth. We may very well have to transform a debt-based monetary architecture before we can explore deep space. Our finance principles and understanding of value must embrace an expansive universe, and recognize our ability to explore and understand it, as well as our capability to invent the technologies needed for the journey.

The nature and time characteristics of debt-based money challenge humanity's ability to allocate large amounts of investments into projects with uncertain cash flows involving incalculable risks, i.e., space related projects.

A Space Value of Money principle is needed to expand our financial models beyond risk and time, formally incorporating space, and the impact of cash flows on the planet, and its inhabitants. Incorporating space into our value creation equations will open the gates to investments that may make no sense from a risk, or payback time perspective, but make tremendous sense from a space and evolutionary perspective.

NOTHING PREVENTS US FROM BACKING MONEY CREATION WITH MORE THAN JUST DEBT INSTRUMENTS. IT IS UP TO US TO DECIDE. WHILE CHOOSING, OUR ANALYTICAL CONTEXT MUST BE AN EXPANSIVE MOLECULAR UNIVERSE.

We can then improve a debt-based monetary architecture by, first of all, introducing an alternative money creation channel that does not add more debt to the system, and allocates debt-free money to projects that create value. We can allocate large sums of money to space exploration via Public Capitalization Notes (PCN), which are profit and risk sharing, public investment instruments, designed to be issued by governments or government agencies and purchased by the Central Bank, the Federal Reserve in the US. Indeed, nothing prevents us from backing money creation with more than one type of instrument. Our ability to print money based on wealth creating investments is key to the development of our space potential.

Meanwhile, in a debt-based system, the Federal Reserve is injecting 40 Billion USD every month by purchasing Mortgage Backed Securities (MBS). MBSs allocate the newly invented money to the banks, counting on bank credit expansion in an overleveraged and recessionary economy. While they could inject 40 billion into space exploration and NASA via a PCN.

We can, should, and must imagine money better.

A- Money Creation and Expansion

Money is invented to serve a very valuable purpose, to facilitate the exchange of value. We create the value we exchange, we create the banknotes and digits through which we exchange it. This is a human invention, practiced by sovereign states and monetary authorities.

States are responsible for money creation. Indeed, the creation of money happens through an exchange between two arms of the state, the government and the central bank.[1] The printing of banknotes, cotton and linen, is done by central banks and it is backed in an accounting sense through the purchase of government debt. Tables 1 and 2 provide the balance sheets of the Bank of England and the Federal Reserve. We observe how government T-bills in the US and government issued or guaranteed securities in the UK are used to back the issuance of banknotes.

Recently, the Bank of England and the Federal Reserve have been actively engaged in Quantitative Easing, i.e., injecting new money into the banking system via the purchase of debt instruments. The Federal Reserve is currently committed to 40 billion USD monthly purchases of Mortgage Backed Securities from the banking system. This injection may be in the form of new digits, but it is still backed by debt.

[1] The legal structure of different Central Banks vary. In all cases however, state legislatures have ultimate decision making responsibility through the banking laws they pass or change.

Table-1: Selected Components of the Federal Reserve Balance Sheet, 2009-2011

Source: Federal Reserve

Table 1. Selected components of the Federal Reserve balance sheet, 2009–11
Millions of dollars

Balance sheet item	Dec. 30, 2009	July 7, 2010	Feb. 23, 2011
Total assets	**2,237,258**	**2,335,457**	**2,537,175**
Selected assets			
Credit extended to depository institutions and dealers			
Primary credit	19,111	17	24
Term auction credit	75,918	0	0
Primary Dealer Credit Facility and other broker-dealer credit	0	…	…
Central bank liquidity swaps	10,272	1,245	70
Credit extended to other market participants			
Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility	0	…	…
Net portfolio holdings of Commercial Paper Funding Facility LLC	14,072	1	…
Term Asset-Backed Securities Loan Facility	47,532	42,278	20,997
Support of critical institutions			
Net portfolio holdings of Maiden Lane LLC, Maiden Lane II LLC, and Maiden Lane III LLC[1]	65,024	66,996	64,902
Credit extended to American International Group, Inc.	22,033	24,560	…
Preferred interests in AIA Aurora LLC and ALICO Holdings LLC	25,000	25,733	…
Securities held outright			
U.S. Treasury securities	776,587	776,997	1,213,425
Agency debt securities	159,879	164,762	144,119
Agency mortgage-backed securities (MBS)[2]	908,257	1,118,290	958,201
Memo			
Term Securities Lending Facility[3]	0	…	…
Total liabilities	**2,185,139**	**2,278,523**	**2,484,141**
Selected liabilities			
Federal Reserve notes in circulation	889,678	907,698	956,012
Reverse repurchase agreements	70,450	62,904	59,484
Deposits held by depository institutions	1,025,271	1,061,239	1,297,905
Of which: Term deposits	…	2,122	5,070
U.S. Treasury, general account	149,819	16,475	23,123
U.S. Treasury, Supplementary Financing Account	5,001	199,963	124,976
Total capital	**52,119**	**56,934**	**53,035**

Table-2: Balance Sheet of Bank of England Issue Department, 2010

Source: Bank of England, Financial Statement 2009-2010

Assets (£m)		Liabilities (£m)	
Securities of, or guaranteed by, British Government	5,679	Notes issued	50,220
Other Assets, Including those acquired under reverse repurchase agreements	44,541		
Deposit with Banking Department	*26,655*		
Reverse repurchase agreements	*17,886*		
Total Assets	**50,220**	**Total Liabilities**	**50,220**

Table-3:Government Debt as a Percentage of Nominal GDP for a Selection of OECD Countries

Source: OECD Economic Outlook, Volume 201,1 Issue 1, No. 89

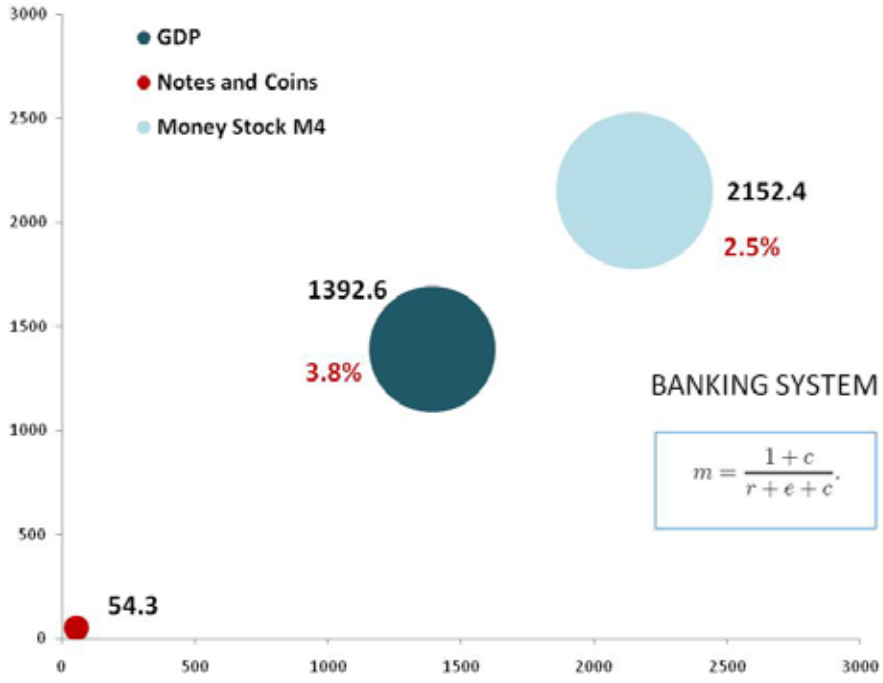
General government gross financial liabilities
Per cent of nominal GDP

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Japan[3]	135.4	143.7	152.3	158.0	165.5	175.3	172.1	167.0	174.1	194.1	199.7	212.7	218.7
Greece	115.3	118.1	117.6	112.3	114.8	121.2	115.6	112.9	116.1	131.6	147.3	157.1	159.3
Italy	121.6	120.8	119.4	116.8	117.3	120.0	117.4	112.8	115.2	127.8	126.8	129.0	128.4
Iceland	72.9	75.0	72.0	71.0	64.5	52.6	57.4	53.3	102.0	120.0	120.2	121.0	120.2
Portugal	60.2	61.7	65.0	66.8	69.3	72.8	77.6	75.4	80.6	93.1	103.1	110.8	115.8
Ireland	39.4	36.9	35.2	34.1	32.8	32.6	28.8	28.8	49.6	71.6	102.4	120.4	125.6
Belgium[1]	113.7	112.0	108.4	103.5	98.5	95.9	91.7	88.1	93.3	100.5	100.7	100.7	100.4
France	65.6	64.3	67.3	71.4	73.9	75.7	70.9	72.3	77.8	89.2	94.1	97.3	100.0
United States	54.5	54.4	56.8	60.2	61.2	61.4	60.8	62.0	71.0	84.3	93.6	101.1	107.0
Germany[2]	60.4	59.8	62.2	65.4	68.8	71.2	69.3	65.3	69.3	76.4	87.0	87.3	86.9
Canada	82.1	82.7	80.6	76.6	72.6	71.6	70.3	66.5	71.3	83.4	84.2	85.9	88.0
United Kingdom	45.1	40.4	40.8	41.5	43.8	46.4	46.1	47.2	57.0	72.4	82.4	88.5	93.3
Austria	71.1	72.1	73.0	71.2	70.8	70.9	66.6	63.1	67.3	72.6	78.6	80.0	81.6
Netherlands	63.9	59.4	60.3	61.4	61.9	60.7	54.5	51.5	64.5	67.6	71.4	74.3	75.2
Spain	66.5	61.9	60.3	55.3	53.4	50.4	45.9	42.1	47.4	62.3	66.1	73.6	74.8
Poland	45.4	43.7	55.0	55.3	54.8	54.7	55.2	51.7	54.5	58.4	62.4	65.6	66.3
Finland	52.5	50.0	49.6	51.5	51.5	48.4	45.5	41.4	40.6	52.1	57.4	62.7	66.1
Denmark	60.4	58.4	58.2	56.6	54.0	45.9	41.2	34.3	42.6	52.4	55.5	57.1	60.0
Norway	32.7	31.6	38.8	48.2	51.0	47.9	59.4	57.4	54.9	48.0	49.5	56.1	51.2
Sweden	64.3	62.7	60.2	59.3	60.0	60.8	53.9	49.3	49.6	52.0	49.1	45.4	41.1
Slovenia	..	33.7	34.8	34.2	35.0	33.9	33.8	30.0	29.7	44.2	47.5	52.9	56.5
Switzerland	52.4	51.2	57.2	57.0	57.9	56.4	50.2	46.8	43.7	41.5	40.2	38.7	37.0
New Zealand	36.9	34.9	33.0	30.9	28.2	26.9	26.6	25.7	28.9	34.5	38.7	45.8	52.0
Korea[4]	..	..	19.2	19.3	22.6	24.6	27.7	27.9	29.6	32.5	33.9	33.3	33.4
Australia	24.6	21.8	19.8	18.3	16.5	16.1	15.3	14.2	13.6	19.4	25.3	29.3	30.9
Luxembourg	9.2	8.2	8.4	7.9	8.6	7.6	12.1	11.7	16.4	14.7	19.7	20.5	23.9

OECD Economic Outlook, Volume 2011 Issue 1 - No. 89 - © OECD 2011

Chart-1: Notes, Coins, Money Stock, and GDP, 2011

Source: Bank of England, 08/2011



As Table-3 demonstrates, government debt levels in OECD countries show how central public debt is to the system. It also shows how debt levels have increased during the recent crises, but have done so previously as well, given the systemic role of debt.

Money is created via debt instruments, and it grows via debt instruments. Credit creation via the banking system is responsible for the creation of new deposits which explain the size difference of Notes and Coins and the Money Stock M4 in the UK, as described in Chart-1. The same difference can be seen all over the world. The money multiplier responsible for money supply growth is a credit driven multiplier managed by the lending strategies and policies of banks, controlled and monitored by the central bank.

The debt logic of money mechanics today is a serious evolutionary challenge. The most tangible and immediate implication of the debt-based monetary architecture is that it binds the species to calendar time. Individuals, small businesses, governments, municipalities, and corporations, are in vast majority exposed and bound to calendar time payments and debt obligations, one way or another.

Money is made up of cotton and linen and zeros and ones, it is invented by humans, it is co-created by the central bank and government, it is debt based, and grows via credit. Indeed, one would hope that we are not ridiculed across the galaxy for matching the expansive nature of the Universe, with money creation methodologies that are restrictive, exhausting, and absurd.

The state is the ultimate source of money and debt, and the banking system is responsible for the expansion of the money supply through credit. The question is, why? why have we adopted such a system? The answer can be found in the broader economic principle that governs much of economics today, i.e., scarcity. Scarcity is perceived and taught to be a key ingredient of value. The scarcity of money, and its availability via debt, is part and parcel of the same economic framework.

Given the size and nature of the universe compared to us here on planet Earth, space is hardly scarce. What seems to be scarce is time. A calendar time bound species is chained to the surface of this planet, by its inability to print, inject, and create the money it needs to develop the technology required for galactic expansion. Budget cuts and debt limits come in the way.

Space projects are risky and have no predictable cash flow patterns. Their benefits are spread across generations, and may not always make sense from the perspective of the mortal investor.

Space exploration depends on us developing financial principles and models of value creation that go beyond risk and time. Our finance principles must also include a Space Value of Money principle, where the value assessment is not done from the perspective of a mortal investor, but from the perspective of the impact on humanity, the planet, and space.

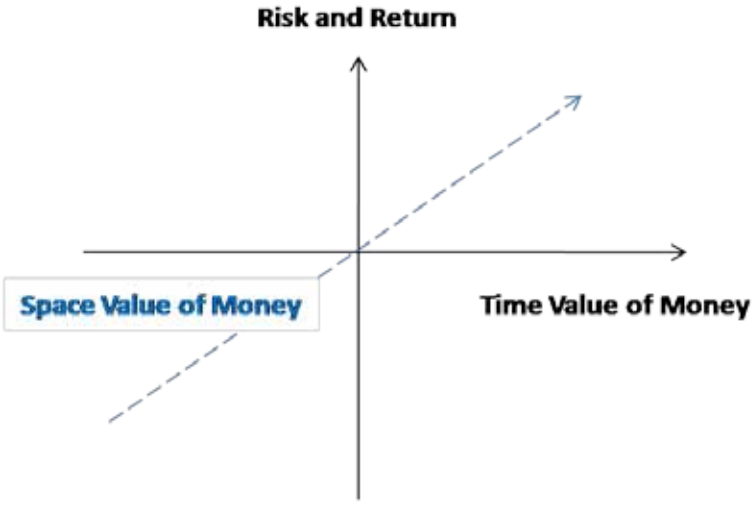
B- Space Value of Money

Finance and Economics need to make more formal room for Space in the theoretical as well as practical models of value creation and valuation. Current finance theory is built on two key principles: risk and return, and time value of money. There is no formal reference to space.

The mortal investor seems to be the key stakeholder of our financial valuation models. Risk and return and time value of money, the two key principles of financial valuation, tailor our acceptance or rejection of opportunities based on a discounted present value of future expected cash flows. This process is the process of assessing the current monetary value of future expected cash flows by discounting them to the present using the return of an alternative investment with the same level of risk.

Chart-2: Examples of Time Value of Money and Risk and Return Equations

Source: Author



$$PV = \frac{FV}{(1+i)^n} \qquad PV = \sum_{t=0}^{n} \frac{FV_t}{(1+i)^t}$$

$$\mathrm{E}(R_i) = R_f + \beta_i(\mathrm{E}(R_m) - R_f)$$

The space impact of expected cash flows is not considered formally in our standard financial valuation models. Although a private investor can dismiss the space impact of cash flows as an investment decision, public institutions cannot. State and government investment projects require a formal assessment of space impact. As public servants, governments must optimize the welfare benefits and positive externalities of their expenditures. I propose complementing time value of money and risk and return with an alternative value principle, Space Value of Money.

Figure-1: Space Value of Money

Source: Author

Space Value of Money is the yardstick that measures the impact of cash flows, not their overall profitability from the perspective of the mortal investor (Risk and Time). An assessment of the space value of money involves an assessment of the assets it creates or utilizes, and the mode of utilization or creation.

Space Value of Money is the aggregate net asset impact of cash flows, taking into account monetary as well as real socioeconomic, scientific, technological, human and other factors.

Given the time and risk features of space exploration, current financial models, indeed, current money creation methodologies, cannot properly cope with space technology financing. Debt or Public debt financed space exploration is unsustainable given past experience and evidence from currently ongoing sovereign debt crises.

Space needs significant and steady investment in education, technology, science, industry, and a host of other areas relevant to extending our reach into the cosmos.

Indeed, our reach into the cosmos depends on our technological imagination as well as on our financial imagination. Without a Space Value of Money principle, and with a debt based monetary architecture, the species is bound to calendar time payments, and is focused on pricing risk. A sustainable, broad based, welfare enhancing space exploration program will need some form of a public debt-free financing.

Indeed, once our valuation principles include space, and our economics reflects its abundance, our technological imagination would be supported with a commensurately cosmic financial framework, facilitating the further expansion into space.

2.5 Billion USD

Space Value of Money!!

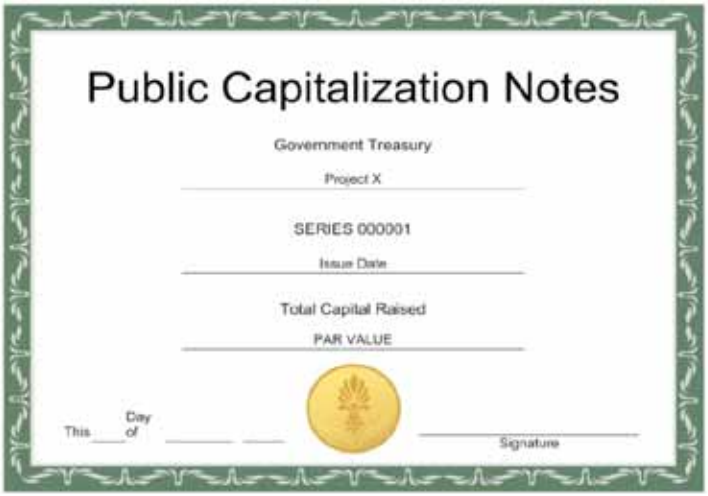
C- Wealth Based Money Creation

We can create money via a number of different types of financial instruments, and we should indeed use such diversity for systemic health purposes. We can back the creation of money by instruments that share risks and profits, without any debt component. We can back money by public investments rather than public debt.

Public Capitalization Notes (PCNs) are designed exactly for such a purpose. PCNs can be used to inject new money through a logic of wealth creating public investments, rather than debt. Stimulating growth and innovation, PCNs allow the channeling of funds into real industry projects, adding value while creating new activity.

Figure-2: Public Capitalization Notes

Source: Author



As described in Figures 3 and 4, Public Capitalization Notes are conceived as instruments used for monetization. The country's central bank, or Federal Reserve, is the intended buyer of PCNs, as a money creation channel that is not debt or credit dependent, and creates income as expenditure from the very beginning.

PCNs are conceived as a money creation channel, not a bureaucracy building opportunity. PCNs must engage and encourage expenditure into targeted industry projects, via private enterprises, private public partnerships, and banks. Projects must be selected upon merit, and must be run with discipline and integrity.

The government treasury could issue or sponsor the issuance of a PCN by a government agency. Indeed, NASA is an ideal candidate to issue a SPACE PCN, that channels newly injected money into the economy via spending into research, technology development, and innovative breakthroughs.

Figure-3: PCN Structure

Source: Author

Figure-4: PCN As A Monetary Tool

Source: Author

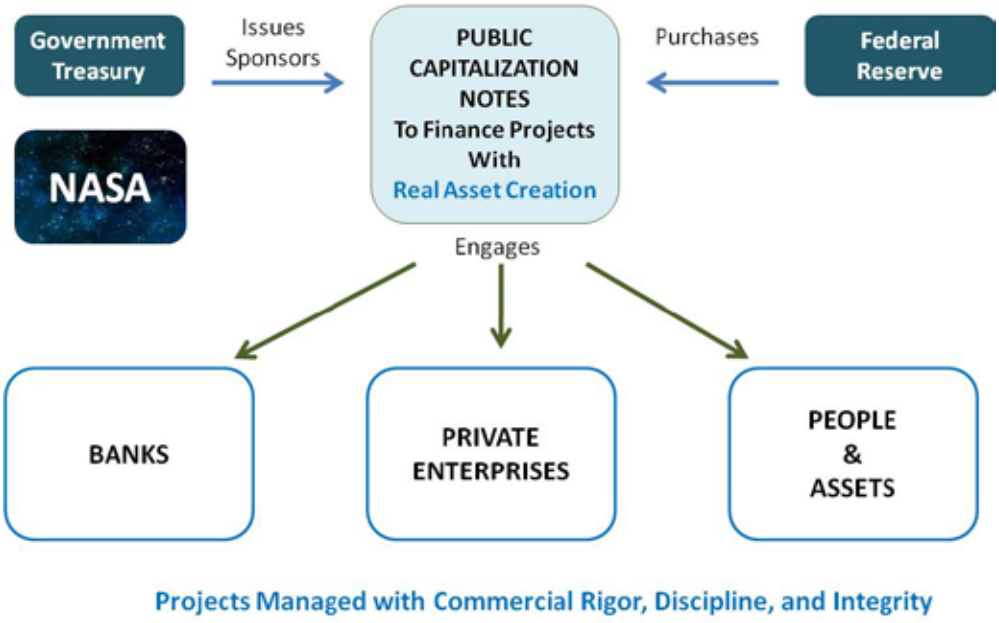


Figure-5: Macroeconomic Benefits of PCNs

Source: Author

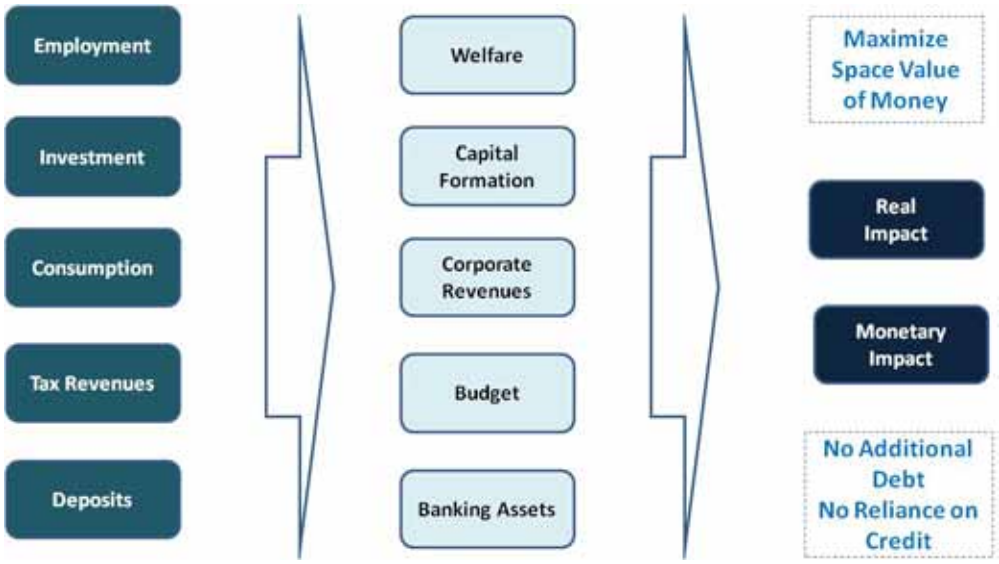
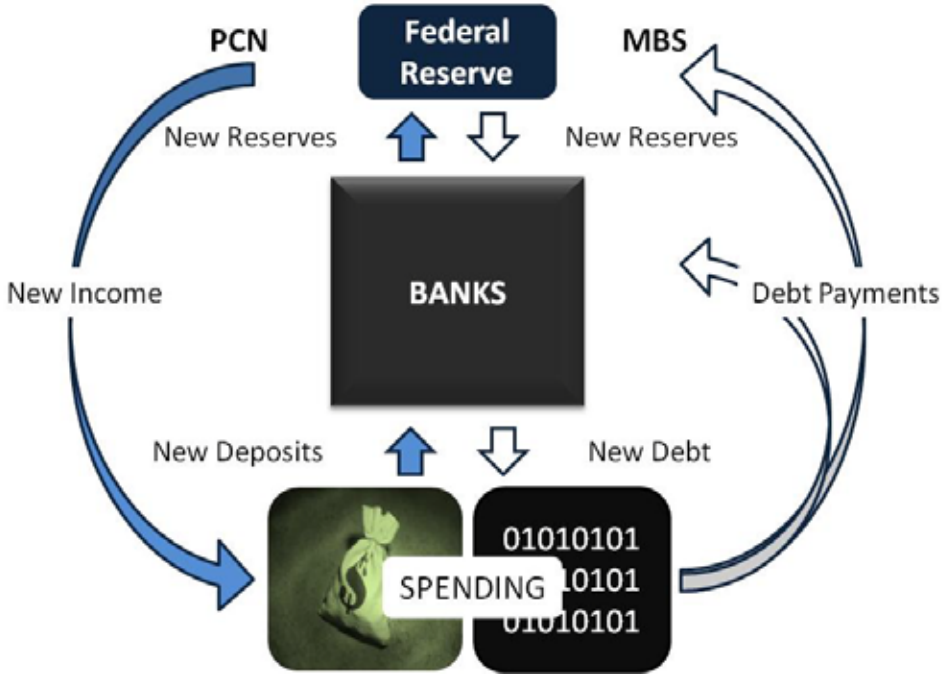


Figure-6: Public Capitalization Notes (PCN) vs. Mortgage Backed Securities (MBS)

Source: Author



PCNs have a direct impact on the macroeconomy because they redirect new money injection from the banking system to a specific industry via project investments and expenditure. As described in Figure-5, PCNs create employment, investment, consumption, tax revenues, and new deposits. They encourage general welfare, capital formation, corporate revenues, balanced government budgets, and an increase in banking assets.

Public Capitalization Notes maximize space value of money, by maximizing the economic, social, cultural, technological, and scientific impact of newly invented money. They do so without debt and without any reliance on bank credit.

Meanwhile, Mortgage Backed Securities (MBS), create money via a logic of debt and inject it in the banking system first, such that it needs to be lent out to become direct expenditure. Figure-6 describes how in fact from the perspective of the Federal Reserve, the two channels should be equally viable, depending on circumstances. This is so because MBS and PCN eventually imply an increase in the reserves of the banking system, but through two different routes, two different instruments.

Mortgaged Backed Securities invent the new money into the banking system, and thus for the newly invented money to become spending it needs to be lent out by the banks. Public Capitalization Notes invent the new money into real projects involving real asset creation, and thus inject the new money as income first.

IN OVERLEVERAGED ECONOMIES FACED WITH LARGE DEBT LIMITS, CREDIT-DEPENDENT DEBT-BASED QUANTITATIVE EASING (MBS) MAY NOT BE AS EFFECTIVE AS WEALTH-BASED INCOME GENERATING QUANTITATIVE EASING (PCN).

Furthermore, the recently designed and implemented quantitative easing in the UK and the US have been relatively ineffective because of the reasoning discussed above. As described in Fgure-7, the Federal Reserve recently announced monthly purchases of Mortgage Backed Securities worth 40 billion USD. Indeed, there is no reason why these injections could not be redirected into real projects via appropriately sanctioned instruments, such as a NASA Issued and Treasury Sponsored PCN.

Indeed, a PCN program could be used to inject larger amounts of capital into space exploration over the next decade. A PCN program could be designed to direct 2 trillion USD into space exploration over the next 5 years.

The debt free injection will create new money, just like mortgage backed securities, will generate new tax revenues, and will support economic recovery. Furthermore, it will inject the much needed income that governments, households, and businesses need to pay down their debts.

Figure-7: QE3 and 40 Billion A Month Via Mortgage Backed Securities

Source: Bloomberg

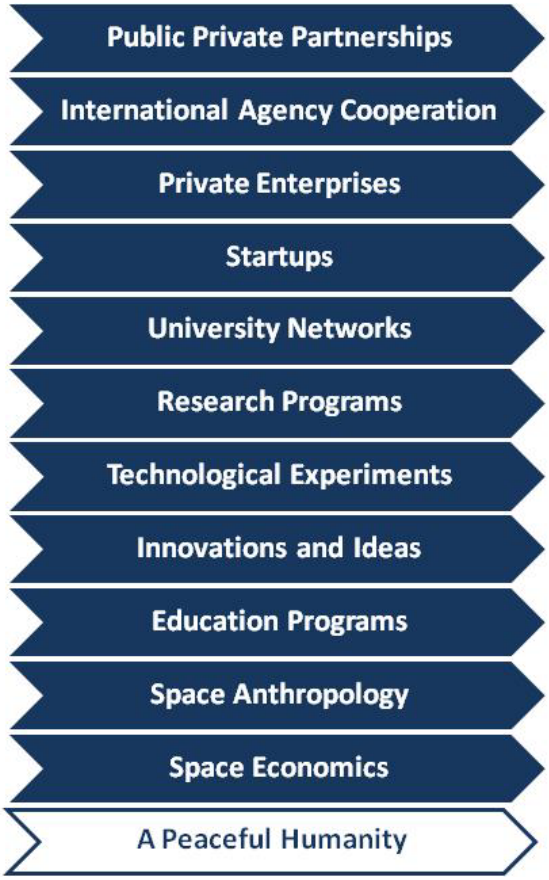
The Federal Reserve could invent the next monthly 40 billion USD via a PCN that allocates the funding to the space exploration industry through NASA, rather than to the banks via Mortgage Backed Securities.

Indeed, the Bank of England has been inventing almost 50% of the British Pounds in circulation through an internal deposit, see Table 2. If money can be backed by a deposit in the other branch of the same bank, it sure can be backed by Public Capitalization Notes.

A NASA issued Space PCN would aim to facilitate and encourage technological and scientific breakthroughs on our journey into space. A selection of financing objectives, recipients, and targets is given in Table-4.

Table-4: NASA SPACE PCN - Financing Objectives, Recipients, and Targets

Source: Author



Transforming our money creation methodologies may require us to first transform the way we imagine money. Once we actively improve the process and structures of money creation, and build parallel non-debt based channels of money injection, we would be at the gates of a whole new era of value creation.

Wealth-based money creation can indeed be directed at achieving evolutionary breakthroughs in space as well as in other key areas of human life. The time leash of debt based money will not be able to hold us back, and we would be able to design financial models that reflect an expansive molecular universe.

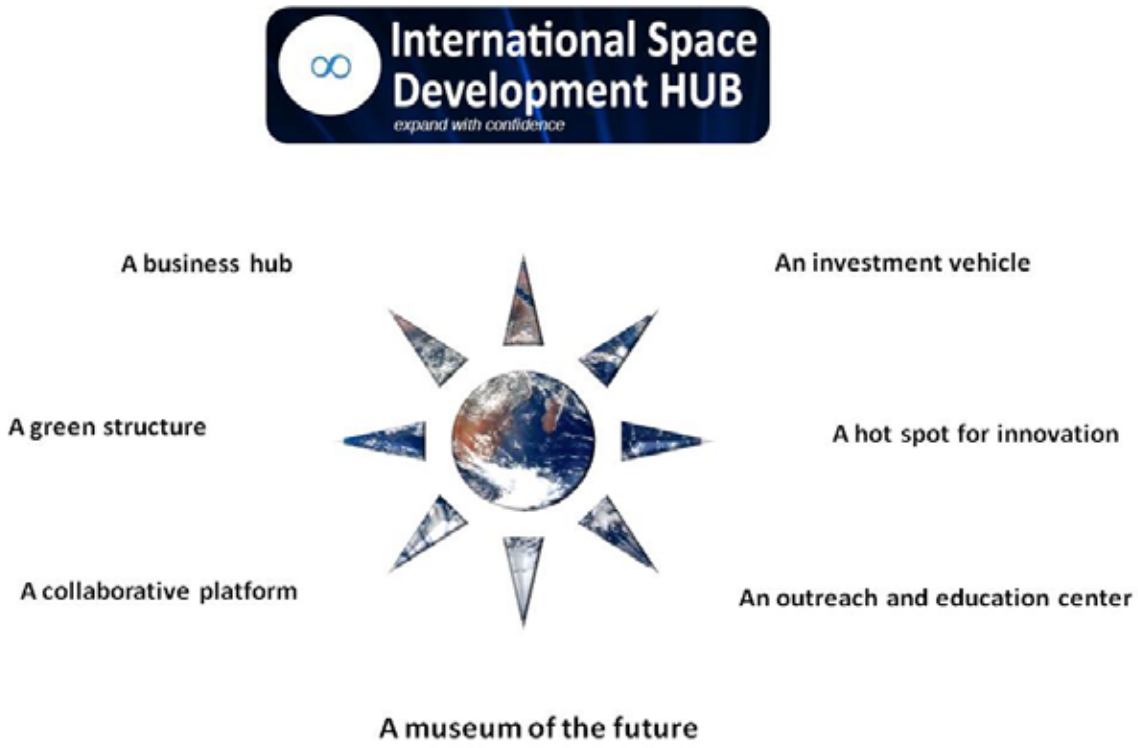
A Space PCN can be followed by a Healthcare PCN and an Education PCN. After all, we owe it to ourselves to invest in our own future, and we owe it debt-free.

D- International Space Development HUB

ISDHub, or the International Space Development HUB, is a unique initiative that aims to build a business hub and an investment platform for the space industry globally. ISDHub JV is a collaborative effort between foundations and private businesses brought together with a common purpose, to channel investments and innovations into an indispensible 21st century industry. Indeed, ISDHub is an ideal avenue through which NASA could put the hypothetical 40 billion provided by the Federal Reserve into the targets and objectives listed in Table-4. Via a NASA ISDHUB SPACE PCN, we could instigate growth and momentum in the domestic economy and initiate a new chapter in space development.

Figure-8: NASA SPACE PCN via ISDHUB

Source: ISDHub



E- Conclusion

PCNs and MBSs are the result of financial engineering, but have very different structures and features. A simple change in the instrument we use to back the creation of money can have an unimaginably significant evolutionary impact. Indeed, the systemic change we need can be delivered by simply introducing an alternative money creation and injection channel using PCNs or similar instruments.

We need to transform money creation, and we need to introduce a new principle of value into finance and economics, i.e., Space Value of Money. Indeed, space is formally unaccounted for in our financial models. Risk and Time invade our attention and guide our valuation analyses. We price risk, and measure our return in terms of time. The space impact of the cash flows is left out of the formal models of valuation.

The perspective that modern finance adopts is the one of the mortal investor. Space Value of Money introduces our footprint and impact on space as a source of value. Thus, a project that may be unattractive to a mortal investor due to high levels of risk and very distant cash flows, can offer tremendous financial value given the assets it creates or utilizes.

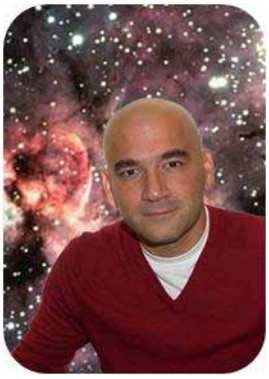
Transforming debt-based money mechanics must be a key evolutionary target for us, as the framework of scarcity and debt undermines our ability to direct our progress in the direction we want, armed with resources we need. We owe ourselves healthy societies and healthy economies, without the self-inflicted burden of debt, the outcome of a self-designed monetary system.

Extending our reach into space is a function of our technological imagination as well as our financial imagination. Our money creation methodology has deep implications on our ability to invest freely in the evolutionary direction we would like to pursue.

We need abundance economics and wealth based money in order to unlock the resources we need to power our journey into interstellar space.

Until then, good luck!

ABOUT THE AUTHOR



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Armen Papazian is a financial economist, senior executive, and an entrepreneur with a track record of innovative successes. He is the founding chairman and CEO of Keipr, a boutique project management and consulting firm, and board member and founding Chief Executive of the ISDHub JV, International Space Development HUB. After earning his PhD in financial economics at the University of Cambridge, UK, he embarked on a career path that led him to achieve capital market history in the Middle East. As a former Managing Director of Innovation and Development at the Dubai International Financial Exchange (Nasdaq Dubai), he led the launch of the Middle East's first Structured Products platform with Morgan Stanley, Deutsche Bank, and Merrill Lynch. He has led the creation of the region's first tradable bond and Sukuk indices with HSBC and the first fungible dual listing with a US exchange in the region.

As a former Head of Islamic Finance for UBS, he was responsible for the Islamic operations of the Bank globally and across all business lines. He served wealth management, asset management, and the investment bank.

He has also made unique contributions to financial valuation theory through the concept of Space Value of Money. He has proposed a unique solution to the global debt-crisis through the design of a unique instrument, i.e., Public Capitalization Notes, conceived as a monetization tool for money creation, transforming the equation of money invention from debt to wealth. He is a co-author of the Star Voyager Roadmap, September 2012, where he addresses the financing of interstellar travel.

Until recently, he held the honorary position of Fellow at the Cambridge University Judge Business School, UK. He has numerous publications in a variety of outlets, he contributes regularly to policy debates in various media globally, and is a widely sought after speaker, economist, and consultant.

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