

When can sustainable finance deliver? a macrofinancial examination

Dirk Bezemer

Hans Stegeman

University of Groningen

Triodos Investment Management

DRAFT VERSION – DO NOT CIRCULATE - Comments welcomed at d.j.bezemer@rug.nl

EXTENDED ABSTRACT

In what sense does the sustainability transition require sustainable finance? Key ideas underlying the assertion that it does, include a view on the nature of private finance as a productive force and a vision of the market economy as transforming financial investments into material change. This paper critically considers these ideas. The aim is to identify the conditions for sustainable finance to deliver on its promises, applying a macrofinancial lens. This shifts the focus from sustainable finance markets to the nature of finance, and to the financial and economic system in which a sustainability transition is to take place.

The paper starts by developing the links between the critical macrofinance paradigm and the monetary theory of production. Capitalism is monetary and financial capitalism, which poses a problem for most versions of the sustainable finance project where it is presumed that there are tight links between money, private finance and investment. This ‘double coincidence assumption’ fails because of the endogeneity of money, the hierarchy of money and finance, and the innate tendency to financial instability. These jointly imply a divergence between the business cycle and the financial cycle. This divergence leads to financial slippage - a rise in assets and liabilities relative to real investment - and increasing financial-market complexity, both of which undermine the efficacy of private sustainable finance. Whereas the sustainable finance challenge is commonly formulated as moving finance away from brown projects to green projects, the challenge really is to move finance away from finance.

Critical macrofinance coupled with the monetary theory of production not only helps to deconstruct sustainable finance notions but also points to alternatives that work. These include a focus on real outcomes rather than financial instruments, public management of private sustainable investment expectations, credit guidance policies, adding ‘floors and ceilings’ to the hierarchy of money and using high-hierarchy instruments.

Keywords: sustainable finance, monetary theory of production, critical macrofinance, financial slippage

When can sustainable finance deliver?

a macrofinancial examination

CONTENTS

1. Introduction
2. Theoretical framework and preview
3. Capitalism is monetary and financial capitalism
4. The double coincidence assumption
5. Why the double coincidence fails: money is not finance
6. Why the double coincidence fails: finance is not investment
7. Wither sustainable finance?
8. Reflections and conclusions

1. Introduction

“Up until today, there was not enough money in the world to fund the transition; this is a watershed. ... The core message today is that the money is there, the money is there for the transition ...”. Thus Mark Carney, UN Special Envoy for Climate Action and Finance to COP26 delegates in November, 2021. He implied that sufficient money to fund the transition is a necessary condition and a major bottleneck for an ecological and social transition to sustainability.

This view is widely shared not only in the private sector but also in the academic and policy literatures on sustainable finance and in the popular discourse around the transition. “If we want to achieve sustainable development goals, we need to open a new file for green projects and scale up the financing of investments that provide environmental benefits, through new financial instruments and new policies, such as green bonds, green banks, carbon market instruments, green central banking, financial technologies, community-based green funds, etc., which are collectively known as “green finance””, wrote an Asian Development Bank team (Sachs et al, 2019:2).

Kedward et al (2022:8) report several other examples. The Swedish government, guarantees up to 80% of long-term loans to large-scale green industrial projects. France

has extended a zero-interest housing loan policy extended to green housing, delivered through domestic banks who receive subsidies in compensation. The Bank of England and the ECB offer cheap refinancing and differentiated capital requirements green assets.

In sum, much of the policies and efforts around the transition are directed at 'more money' for sustainable investments through financial markets – or what Gabor (2021) has termed the 'Wall Street Consensus' on green transition (and development) finance. This can be critiqued in terms of risk socialization, distribution, and the large discretion for private actors to decide what is green. But the point in the present paper is to critique it for its underlying assumption that money equates to finance, and finance to investment.

We will use 'sustainable finance' (SF) as the umbrella term for all such efforts, both private and public. Note that this definition implies nothing about the actual (sustainability-enhancing or other) effects of SF. Indeed a key point in the paper will be that it is inherent in the nature of modern finance that this is hard to observe.

SF prominently includes the Green Bond market (Banga, 2019), which accounts for about 1% of the total debt issued in conventional bond markets in, 2022 (Amundi and IFC, 2021; Almeida, 2020). Bonds are considered 'green' if their 'proceeds are committed to the financing of green projects, such as renewable energy, waste reduction, recycling, water conservation, and the building of green facilities' (Flammer, 2021) - although in practice it is hard to link bonds to what they finance. Formally, bonds are 'green' if certified by e.g. the private Climate Bonds Standard and Certification Scheme, the International Capital Market Association's Green Bonds Principles, the Climate Bonds Standard designed by the Climate Bonds Initiative or the European Union's Green Bonds Standard (Climate Bonds, 2022, ICMA, 2021; CBI, 2019; EC, 2021).

SF includes also 'green' banks offering better credit conditions for sustainable projects, aggregating small projects to commercial scale, fostering market expansion through dissemination of information, and creation financial innovations. One such innovation is the sustainability-linked loan, in which the interest rate is linked to improvement of the company's sustainability indicator (ESG score, or other KPI).

More indirectly, SF also includes efforts by central banks to address environmental risk and promote sustainable finance (Chenet et al, 2021). Official central bank decarbonisation policies seem to adopt a 'two-pillar approach: enhancing price discovery (market-fixing) and correcting price signals (de-risking)' (Kedward et al, 2021:6).

SF also includes initiatives to mobilize and coordinate financial-sector actors, for instance in the 'Glasgow Financial Alliance for Net Zero', addressed by Mark Carney in November, 202. This unites 500 global financial services firms (bankers, insurers and investors) who agreed to align \$130 trillion (40 per cent of the world's financial assets) with the Paris Agreement climate goals.

The rationale for all these forms of SF is that they 'enable immediate investment in climate change mitigation and adaptation' as a recent World Bank report on green bonds puts it (Heine et al, 2021). The 'immediate' connects to the traditional view on finance as a tool to make current investment possible, instead of having to wait until the savings have accumulated to pay for it. SF is also seen as a means to build financial markets in which it is more difficult to access funds without aligning production with net-zero emission goals (ICMA, 2021).

In the present paper an analytical framework will be developed to evaluate the efficacy of SF, to critique its praxis, and to suggest conditions for it to 'work'. The aim is to deliver practical insights into the limits and promises of SF, based on an analysis of the nature of finance and the nature of the market economy within which finance functions. The paper will not engage important questions about the various (social, ecological) dimensions of sustainability, as for instance spelled out in the SDGs. It will also not consider the different effects of the range of financial assets and instruments used in SF, nor methods to rate assets and to measure impacts (Busch et al, 2021), or corporate governance structures that foster sustainable corporate behaviour. At issue is a more fundamental question preceding research and debate in each of these important areas. Is sustainable finance a prerequisite to the sustainability transition?

This is the (often tacit) assumption underlying most sustainable finance activity and analysis. Therefore in the SF conversation, the focus is more on 'sustainable' than on 'finance', so that foundational ideas on finance and its role in the economic system are

often taken for granted. The premise of this paper is that it is helpful to step back and examine these ideas – to ask not what finance is for, but what finance is, what its role within the wider economic system is, and how this delineates the uses that finance can be put to.

2. Theoretical framework and preview

This investigation is inspired by the analytical framework of the ‘critical macrofinance’ paradigm in the study of finance and macroeconomics (Dutta et al., 2020; Gabor, 2020; Tooze, 2018). The ‘macro’ in critical macrofinance refers to studying the logic of the monetary-financial system as system (rather than studying financial firms or flows) with Kalecki, Keynes, Schumpeter and Minsky as notable progenitors. The macrofinance framework, which is very much an emerging paradigm (Murau and Pforr., 2020), straddles ‘money view’ research (Mehrling, 2013) post-Keynesian macroeconomics (Lavoie, 2014; Bonizzi and Kaltenbrunner, 2020) and the politics of money (Koddenbrock, 2019; Braun., 2020). The ‘critical’ in critical macrofinance derives from the explicit consideration of actor interests and from the involvement of states in macrofinancial dynamics, which renders the subject overtly political. And the ‘finance’ in critical macrofinance is about its focus ‘to perceive the world as a hierarchical web of interlocking balance sheet’ (Murau and Pforr, 2020; Bezemer, 2016).

While critical macrofinance ‘encompasses macroeconomics, finance and accumulation’, (Dafermos et al, 2022), its analysis mostly to do with the ‘co-evolution of global finance and the macro-institutions of the state’ (Gabor, 2020:45). A less developed side concerns the linkages between the monetary-financial system and real-sector macroeconomic outcomes in terms of investment, income and distribution – topics which were central to the economics of Keynes, Kalecki, Schumpeter and Minsky and approaches building on them, notably ‘circuit theory’ and the ‘monetary theory of production’ (Graziani 1989., 2003), ‘modern monetary theory’ (Wray, 2015, Kelton, 2020), ‘financial keynesianism’ (Whalen 1999) and Post-Keynesian theory generally (Bonizzi and Kaltenbrunner, 2020). Development of the critical macrofinance approach benefits from a firmer grounding in the Post-Keynesian macroeconomics of production,

circulation and finance. These aspects are entirely compatible and their integration is potentially fruitful, as will be shown in this paper.

For the purpose of this paper therefore, we summarize augmented critical macrofinance position in two connected sets of tenets. Both sets of tenets start from the overarching analytical position that capitalism is monetary and financial capitalism. The first set of tenets is primarily monetary and financial, the second primarily macroeconomic.

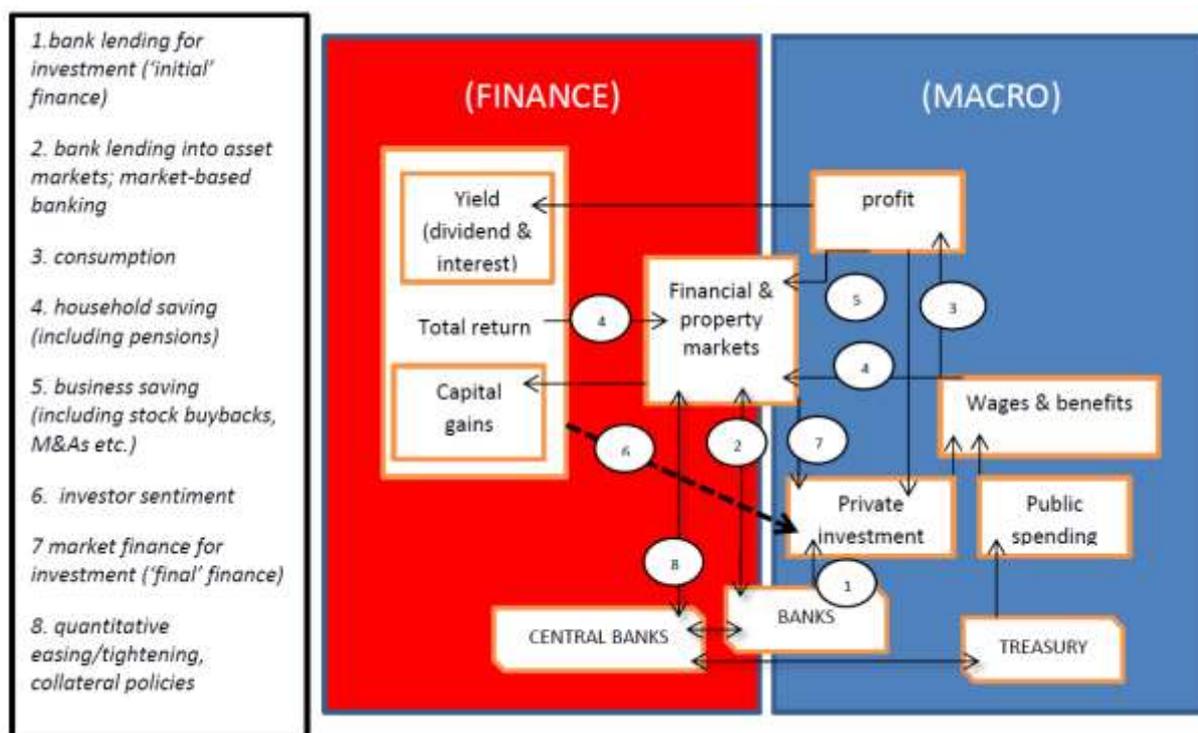
1. money is endogenous to (public and private) finance, notably bank credit and deficit spending
2. finance is hierarchical, with a structural tendency to financial innovations, instability, and 'financial slippage' (explained below)
3. financial innovations create liquidity, debt, yield and capital gains; financial instability destroys them.

These monetary and financial features link to macroeconomic dynamics because

4. private finance follows total returns: yields (dividends, interest) plus capital gains.
5. aggregate (public and private) investment leads to aggregate profit
6. private investment results from effective demand and expectations
7. Treasury spending supports public investment and aggregate profit
8. central bank operations support yields and capital gains

This overlaps with other such summaries of key insights of critical macrofinance (as in Tooze, 2018; Gabor, 2020), but without the international dimension (the dollar cycle, global central banks, international coordination and institutions, capital flows and global bond markets). This is a notable limitation, introduced to maintain a focus on the linkages with investment and production in the domestic economy, since these are the terms of rationalization of sustainable finance. The purpose will be to flesh out the domestic and production-related arms of critical macrofinance.

Figure 1: Macro-finance interactions in a closed economy



Source: authors' own. Notes: letter in capitals denote actors, lower case letters denote financial flows (investment, lending, saving, consumption), financial stocks (financial and property markets), or financial valuations (capital gains). All (bi-)directional arrows except arrow 6 denote contributions in money terms, e.g. consumption contributes to profit, bank lending contributes to private investment spending, property market investment contributes to capital gains and to bank funding (in market-based banking). The dotted arrow 6 denotes a casual effect from total returns via investor sentiment on private investment. This effect runs through banks and markets; these routes are not indicated for legibility.

Figure 1 is a stylized flow chart representation of some of the intersections of Post-Keynesian macroeconomics and the financial system (for a closed economy). Since this reflects the monetary theory of production, all is monetary. There are money flows and stocks, but the material production processes (which they may or may not represent) are not in the model. This is not to deny their central importance. But the premise in the monetary theory of production is that understanding the macroeconomy requires understanding the relations between the monetary flows in the macroeconomy (e.g. that aggregate money investment determines aggregate money profit). Hence the focus, which is elaborated in section 3.

The left hand-side depicts prominent themes in critical macrofinance: banks and central banks create the liquidity (arrows 2, 6 and 8) that supports capital gains and maintains

public spending by the treasury and asset values in financial markets (Murau and Pforr,, 2020). They do so in pervasive interdependence with these markets in ‘market-based banking’ and with monetary policies hinging on repo transactions and asset purchase programs (Gabor, 2016). The context for these processes is the ever-changing hierarchy of money and the politically motivated interactions between central banks and financial market actors.

The right-hand side of Figure 1 is the monetary production economy envisioned by Keynes (1933) and Kalecki (1943), and developed by Graziani (1989;2003) in circuit theory. Aggregate business investment plus public spending (both investment and other expenditures) create the aggregate demand, via wages and consumption (arrow 3), for aggregate profit levels that animate the capitalist economy. The investment-profit causal sequence, an ‘investment theory of the business cycle’, is Kalecki’s (1943) and Keynes’ (1936) most famous contribution to economic theory.

But whereas for Kalecki and Keynes all business returns are profits, modern capitalism really is a ‘two-price’ system (Minsky 1975) where financial asset prices and returns as much as consumer prices and productivity drive the dynamics. Profit feeds into yields and asset prices, which are therefore viewed as indicators of the economy’s health, and they are the basis for private investor sentiment. But crucially, yields and asset prices are not determined in the real sector, but in the financial markets.

Private investment is driven by sentiment (Keynesian ‘animal spirits’ – arrow 6) that shapes expectations and the willingness to invest. Note that arrow 6 does not depict market liquidity (this is arrow 7) which cannot cause investment, but sentiment, which can. Other sources of liquidity for investment apart from markets (or ‘final finance’, in circuit theory terms) are retained profit and bank lending (‘initial finance’, in circuit theory). Bank lending may be an investment bottleneck, but like market finance, credit creation cannot by itself cause investment (‘pushing on a string’ – a common assumption in the SF debate).

If sentiment turns from optimistic to pessimistic, private investment may fall short of the level needed to maintain healthy growth. Public investment, the other contributor to aggregate demand, may renew the dynamic (and so may foreign demand, not in this

picture). Public investment as the driver of private sustainable investment is typically neglected in the SF debate.

This sequence from sentiment to expectations, financing and investment and onto profit and income growth is how financial markets co-determine the path of capitalism. Whereas Keynes and Kalecki stated an investment theory of the business cycle, Minsky (1975) developed the financial theory of investment that acknowledges this sequence. Minsky (1978) also explained how the interplay of sentiment, leverage, financial innovations, and public interventions imply an innate tendency to financial instability in economies with sophisticated financial markets. This role of expectations expressed in asset prices and returns is also the rationale for central bank policies to target liquidity, asset prices and returns through repo transactions and quantitative easing and tightening (arrow 8), in a bid to maintain financial stability.

The snag is that if successful, this attracts private-sector liquidity (bank lending, dividends, business and household saving; arrows 4 and 5) into financial markets, without necessarily much benefit to investment. This may set off a dynamic of rising asset prices and rising creation of financial assets and liabilities (including debt growth) but not necessarily rising investment. Saving by high-income households out of profit and capital income (arrows 4) may create positive feedback loop from the growth of finance to the growth of finance fueled by capital gains. This possibility is a threat to the efficacy of SF, including central bank 'green' monetary policy.

Set in this analytical framework, each of the above macrofinancial tenets will be developed in this paper in order to think through the role of sustainable finance. Consider them in turn, as a preview of the paper's key arguments.

First, the overarching analytical position is that capitalism is inherently monetary and financial (section 3). Monetary, because its workings in real time cannot be analyzed as a material system, with money and wealth attached, as if these were dispensable additions. Climate change is a physical and not a monetary phenomenon problem, and it will be argued that this is a challenge to the sustainable finance project. And financial, where 'finance' is the total of an economy's assets and liabilities. Finance is required to manage money flows, and the incentives and constraint inherent in balance sheets shape the dynamics of capitalism. But finance, money are the real sector, notably investment,

move with different dynamics. To neglect this is to tacitly make a 'double coincidence assumption' of direct correspondence between finance and money, and between money and investment. This assumption is prevalent in the SF discourse (section 4).

The reason why the double coincidence assumption fails is that money and finance exist as a 'hierarchy of money' (section 5), with endogenous expansions of the money supply, and changes in asset prices intertwined with but not identical to investment. If left unregulated, this leads to a financial overgrowth on the economy's productive structures: steep increases of assets and liabilities, lacklustre investment, and growing financial fragility (section 6). Carney's rallying cry may bring in much finance, but perhaps less investment. Macrofinance explains why.

To neglect this reality is to allow 'financial slippage' and financial waste: a decreasing (or indeed vanishing) correspondence between financial investments and real investments, in an increasingly complex financial system. The endogeneity of money, the hierarchy of money and finance, and the innate tendency to financial instability, jointly imply a divergence between the business cycle and the financial cycle. Because of the monetary nature of capitalism, it is hard to observe and ascertain this financial slippage in real time. Ironically, this helps maintain the double coincidence assumption, since also sustainability is observed in financial terms. Green bonds and other financial investments continue to be celebrated as fostering the greening of production.

A macro-financial view, then, serves to critically consider ideas that are central to the SF discourse. Finance does not as a rule lead to investment, its dynamics do not follow the economy's fundamentals, the bottleneck problem is not a finance gap, and the role of the public sector is pervasive throughout. But not all is deconstruction. The macrofinancial tenets also contain pointers towards alternatives that work (section 7). Section 8 concludes the paper with reflections, implications and suggestions for future work.

3. Capitalism is monetary and financial capitalism

Sustainable finance must confront the challenge of achieving material change with financial means. This is not unique to the sustainability problem; it is a feature that is inherent in the market economy. Problems of climate change and biodiversity loss are problems of material growth in output and emissions, with material consequences in

terms of species abundance, sea levels, temperatures, forest fires and foliage cover, flooding and droughts. But these material processes and outcomes must be confronted in a system that is navigated in terms not of material variables, but in terms of finance and money.

Its logic, which produces materially (and socially) unsustainable outcomes, is not material itself, but monetary and financial. Its growth accelerates when monetary and financial conditions are favourable, regardless of the material consequences. It grinds to a halt when the financial machinery falters - even when there are no shortages of material inputs and no lack of demand for the stuff that is produced.

Some examples illustrate. Keynes (1936) was the first to clearly spell out the monetary nature of capitalism, when he developed a monetary solution to the 1930s mass unemployment challenge. The Great Depression in Keynes' days was the result of insufficient government spending in the face of faltering private spending. Second, the output contractions and the unemployment following the financial crisis of, 2007 were due to a 'run on repo' (Gorton and Metrick, 2012) and the subsequent financial collapse, worsened by austerity policies - all of them entirely financial and monetary processes, but with serious material consequences. Third, the global cereals panic in July, 2022 was not a matter of material supply constraints in Ukraine and Russia or in global wheat storage facilities but of a price spike due to financial positions in wheat futures taken on the Chicago Wheat Exchange (Pettifor, 2022). These are examples of what it means that capitalism is monetary and financial capitalism. Consider this more closely.

First, capitalism is monetary. This does *not* just mean that money is a convenient tool to ease exchange. The monetary nature of capitalism runs deeper. Exchange itself is irreducibly monetary, and so is production and economic growth. Investment, profit, revenues and turnover are all realized first and foremost as money flows. Economic growth is a process that is measured, discussed and managed in money terms. Economic actors cannot but think, decide, project and evaluate everything economic (and a good deal besides) in money terms. And when they act, they do so in terms of money spending. That is why capitalism is inherently monetary. Its workings in real time cannot be analyzed as a material or material system, with money and wealth attached.

To be sure, there is a strong connection between GDP (a monetary measure of economic growth) and emissions and material use. But this does not mean that material and monetary processes in real time map onto each other. GDP is constructed ex post and does not guide investment decisions. In contrast to the tight link between GDP and emissions, there is *no* tight link between *expected* monetary returns (profit, yields and capital gains) on one hand, and emissions and material use (and GDP) on the other hand. Ex ante and in real time, at the moment of investing, when actors need to decide, all is monetary, as Keynes (1936, ch 5) explained. This is the fundamental challenge to sustainable finance posed by the monetary nature of capitalism.

Capitalism is also financial capitalism. All (money) investments and all consumption require a structure of financial assets and liabilities. This structure is denoted in the term 'finance': the total of an economy's assets and liabilities. Capitalism is financial because finance is the fabric of the market economy. It is pervasive - not just something of and in the financial sector, but a structural feature throughout the system. All economic units (firms, households, government, banks) have active balance sheets and all need to balance incoming and outgoing money flows (Mehrling 1999). All are managing their balance sheets so as to be able to satisfy their 'survival constraint' (Neilson, 2020), which is the need to service payment obligations in time (else, they will be bankrupt). Wealth is the buffer between economic actors and their survival constraints now and in the future, and so (among other reasons) wealth must be accumulated. The imperative of not hitting the (future) survival constraint, the ability to access other actors' balance sheets to avoid this, the terms against which this is done in financial markets, and the consequences for liquidity and asset valuations – all this so central to how the system works, that it is fruitful to view capitalism as an interconnected set of balance sheets.

This distinction between monetary and financial capitalism on one hand and the material, physical reality on the other is different from (but related to) the current notions of financial materiality. This means that firms' actions have corporate financial effects and it is different from environmental, social and governance materiality (there are also wider other impacts). In this classification the aim is to achieve 'double materiality', aligning corporate bottom-line financial effects and other consequences so that corporates do the right thing (Boissinot et al., 2022). In this discussion, 'material'

means 'relevant'. There is no perception of a monetary dimension to the market system other than corporate financial metrics. In the current paper, 'material' simply means 'relevant to sustainability', whether in a physical sense or socially. What this paper has in common with double materiality discussions is that to achieve double materiality is a challenge indeed. But going beyond this, the present paper explores how the reasons that this is so hard are deeper entrenched in the nature of capitalism than narrowly corporate financial considerations can reveal.

To believe that what must ultimately drive the economic system are material supply and demand conditions is one of the most enduring fallacies embraced by economists, politicians and the public alike. The logic of capitalism was never about stuff, but about the management of payment flows and balance sheets, and about the accumulation of money and financial wealth.

4. The double coincidence assumption

Superficially, the above may appear to support Carney's focus on money and finance first, so that progress in (material) sustainability will follow. But this would be to equate finance with money; and changes in the private financial markets with changes in the material world of investment and emissions – or in other words, equating financial and productive investments.

In fact, that capitalism is monetary and financial capitalism is not a foundation for sustainable finance but a challenge to the sustainable finance project – at least, insofar it glosses over monetary and financial issues to focus on 'real' (i.e. physical) impacts, as if finance=money=investment. This amounts to a 'double coincidence assumption' of direct correspondence between finance and money, and between money and investment. In this view, finance is often viewed as an exogenous, causal factors that can kickstart (green) development in the material world: '[f]inance is the engine of development of infrastructure projects, including energy projects' (Sachs et al., 2019:1). This assumption is derived from established literatures on finance and growth (Levine,, 2005), on development finance where a 'funding gap' is supposed to exist (Ingram and Mosbacher, 2018) and on capital flows which 'cause' GDP growth (Rajan et al, 2005). In each case, economic growth is expected to results from the 'injection' of money - by

domestic banks, by donors or by foreign investors and financiers - into the economic system.

Underlying this double coincidence assumption is a theoretical view of money and finance which sees all money as created equal, monolithically referred to as 'credit', 'savings', 'liquidity' or 'funds'. Credit, in this view, is the availability of loanable funds supplied by savers to productive firms, as if '[t]he purpose of the global financial system is to allocate the world's savings' (Sachs et al., 2019:3). In well-working markets, credit is supposed to find its way to the most profitable projects circumscribed by economic 'fundamentals' (technology, tastes and demography), so that financial development and real development map onto each other (Levine, 2005). The transition challenge is a 'funding gap' problem of insufficient money for real investment, due to mispriced externalities or missing markets in green financial instruments. Therefore endogenizing externalities (such as carbon pricing) plus financial innovations (such as green bonds and sustainability-linked loans) will ensure that sustainable finance delivers on its promises.

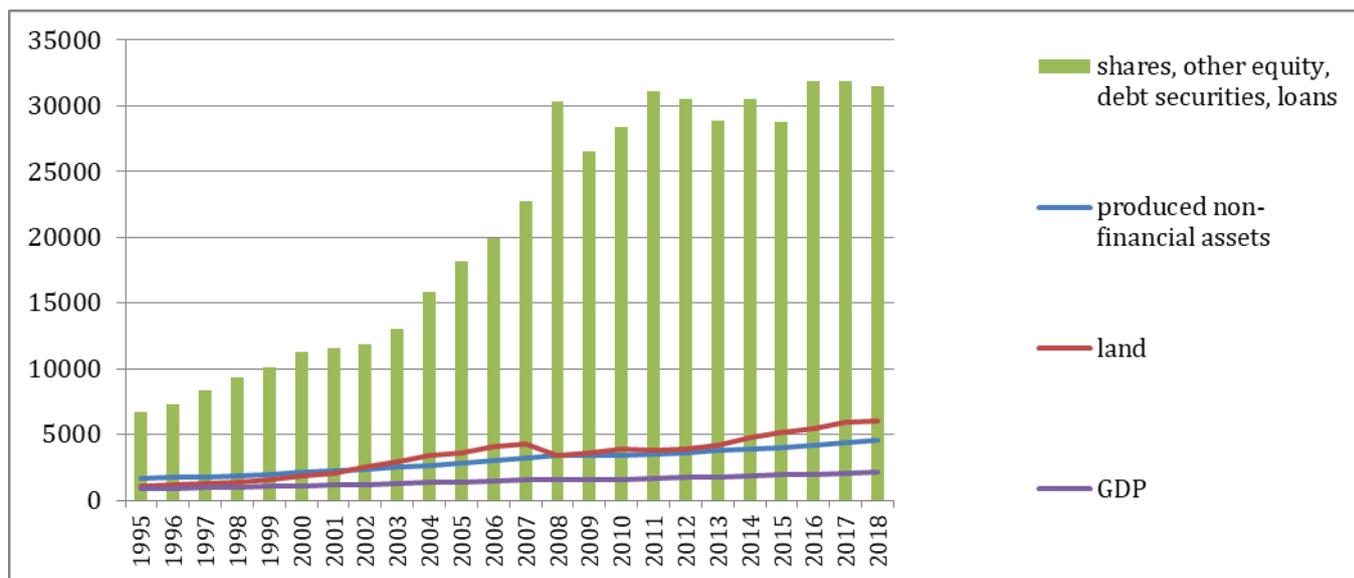
In this view, money and finance are also a-political in nature, subject to the private profit motive that permeates all of capitalism. The only role for state 'interference' is occasional market-fixing policies that address market failures - by introducing a carbon tax, developing and enforcing green finance standards, facilitating financial innovations, and de-risking green bonds as treasuries and central banks take on their balance sheets transition risks, reducing the private investment hurdle for private finance (Gabor, 2021).

The key problem in this frame becomes how to mobilize enough sustainable finance by rallying financiers to the cause, as Mark Carney did in Glasgow, and in particular 'marshalling the capacity of institutionally mobilized capital to support investment opportunities that will secure a sustainable future for all' (Sachs et al, 2019:3). Growth of (sustainable) finance supplied by institutional investors, it is assumed, can be relied on to change the direction of the economy through new money spending on (sustainable) investment, in line with the double coincidence assumption. In Mark Carney's words, the key issue was that "[u]p until today, there was not enough money..." Because this was the bottleneck problem that sustainable finance is facing, its solution overseen by Carney was a "watershed".

However, the double coincidence assumption is not implied in the notion that capitalism is monetary and financial capitalism, although it may seem to be. To note that economic actors navigate capitalism in terms of money and finance does not imply that money and finance are dependable levers for changing material reality. And to say that capitalism is monetary *and* financial capitalism is to say that finance (assets and liabilities) is different from money (settlement medium in the real sector) that could pay for investment.

That the double coincidence assumption fails is apparent in figure 2. We have no reliable data for sustainable finance and investment, but we do have data on *all* finance and investment, and the income resulting from it. Globally since, 2000, assets and liabilities have been growing 50% faster than the global gross domestic product (Woetzel et al, 2021). This must mean that much of the growth of assets and liabilities was not supporting productive investment leading to income growth. On the level of national economies, we see the same trends. For instance for the UK economy, figure 2 plots the nominal money value, in millions Pound Sterling, of produced assets (the result of material investment), land values, the value of financial liabilities, and the annual gross domestic product (or output), measured in Britain's GDP. The GDP records the volumes of money changing hands in transactions that enable investment and consumption. It is an ex-post monetary approximation of the economy's value-added change, also its change in terms of emissions: there is a tight connection between GDP and emissions, as noted.

Figure 2: GDP, land values, produced assets and financial liabilities in the UK, 1995-2018 (million nominal Pound Sterling) replace land with M2



Source: Office of National Statistics. Thanks to Howard Reed for compiling the data. See file 'assets and liabilities in the UK'

Clearly, material and financial dynamics are vastly different: the growth of assets and liabilities (finance) outpaces the growth of material assets. In 1995 the ratio is 4:1, in 2020 it is 7:1. The common story is that this is the rise of 'capitalism without capital' (Haskel and Westlake, 2018) as intangible assets (information, networks, patents) replace material capital in today's economy. However, Britain was not using fewer produced assets (productive tangible capital) to realize its GDP; the capital/GDP ratio hovered between 2.0 and 2.1 over the quarter century. Financial 'capital' however exploded relative to GDP. In 1995, against every Pound Sterling in GDP there were 8 Pounds in equity and liabilities; by 2020 this ratio had risen to 1:15. Equally, land values rose from 60 pence for every Pound value of produced assets in 1995, to 1.3 Pound in 2020 – a more than doubling of that ratio. Wealth was accumulating in property and financial assets that were not productive as the 'rentierization' of the UK accelerated (Christophers, 2019). The unprecedented financial development of the 1995-2018 era was not mirrored in similar rates of productive capital growth or income growth. It was financial wealth and debt and property values that increased, more than income and productive capacity. In fact, there is a 'global portfolio glut': trillions of dollars in institutional investments looking for investible projects (Kedward et al 22:8; also Gabor 2021).

The result is financial 'slippage', as if the gears of finance and investment did not mesh anymore. In an earlier age, economists had quibbled whether finance causes income growth (Schumpeter 1934), or perhaps that 'where enterprise leads, finance follows' (Robinson 1952). At least, they were moving together. But with financial slippage due to assetization and rentierization, the growth of finance has increasingly become a free-standing dynamic. Are there reasons to expect that 'green' financial development will have different effects?

In sum, additions to, or redirections in financial liabilities and assets, which is the process Mark Carney was overseeing in Glasgow in, 2021, bear no direct correspondence to production and consumption, not even in the long run. This divergence questions the potential for on-the-ground change in volumes of production and consumption and emissions resulting from changes in financial assets, whether sustainable-finance assets or other financial assets.

The double coincidence assumption fails since finance has its own dynamics, so that the financial world of assets and liabilities is a different place from the material, physical world of goods and services and of the payment flows of money that are the grease in the material production machinery. Asset wealth is not output; it is not even capital goods investment. Growth in assets (finance) is not the same as growth in the payment flows (money) that realize physical investments leading to consumption. The next section develop an explanation for this. Why does the double coincidence assumption fail, and what theory must take its place?

5 Why the double coincidence assumption fails: money is not finance

The starting point of that explanation is that financial structures reflect a 'hierarchy of money' (Mehrling, 2013). Settlement medium (money) is at the top of a hierarchy of financial assets and liabilities ranked according to their liquidity. This tiered system which is the hierarchy is not accidental or devised; it is innate. Any financial system must be at least two-tiered, with investment assets and settlement medium. Historically, financial innovations have added many more tiers (Minsky, 1986). Moving down the hierarchy from cash to deposits to bonds to shares to derivatives, liquidity decreases as risk and returns are increasing.

Therefore, not all money is created equal - money and finance are not bulk products but they are hierarchical constructs, and they are endogenous. They are defined by the formation and dissolution of credit relations (Ingham, 2013) which give rise to new financial assets and liabilities (finance), some of which become means of payments (money). What is credit (promise of payment) on one level of the hierarchy is money (means of payment) on the next. Repo's are promises to pay bonds, which are promises to pay bank deposits, which are promises to pay currency, which are promises to pay central bank reserves.

Within this hierarchy, loans are not pre-existing savings channeled to borrowers, but endogenous money created by (shadow) banks for counterparties that are perceived as creditworthy, with those perceptions expressed in liquidity preferences (Kaltenbrunner and Bonizzi, 2020). Creditworthiness perceptions – optimism and pessimism – like other social mood variables wax and wane, and may suddenly change. When liquidity preference decreases, the liquidity and moneyness of assets lower in the hierarchy increases as their ability to be used as settlement medium increases. Due to endogeneity and hierarchy, the boundaries of which liabilities may count as money are constantly shifting. And within those boundaries, money creation and destruction follow sentiment and social mood ('animal spirits', as Keynes called them).

So the hierarchy is durable but not static. The liquidity of assets (such as derivatives) low in the hierarchy increases in good times, expanding the effective money supply, pushing up asset prices and inducing more borrowing. All this will boost economic activity and, even more so, financial investments. Therefore, these dynamics are a major source of dynamics in the whole economy. This is the alternative to the assumption of monetary exogeneity. In mainstream 'finance and growth' literature (Levine, 2005), credit creation and money growth are supposed to be causing investment, productivity gains and income growth. But credit creation is endogenous to perceptions of creditworthiness (Lavoie, 2014), which in turn are intertwined with the financial dynamics of asset prices and returns.

Schumpeter (1934), Minsky (1980) and Perez (2002), among others, have theorized this relation between financial and real dynamics. Aggregate money investments cannot be a stable flow, but it occurs in waves linked to technological innovations that are clustered in time due to network and scale effects. Their rising returns attract financing, and this

growth of assets and liabilities is self-sustaining, by generating the liquidity that increases asset valuations and financial returns, so that total returns (yields plus capital gains) rise. This validates further increases in debt and in risk-taking. During this upswing in sentiment, borrowing and risk-taking, the economy's balance sheets are travelling down the hierarchy of money. It is a time of 'financial innovations' as new assets and instruments are invented and traded. At the same time there are typically also rising real investments; financial booms also have some positive real-sector consequences.

The increase in the liquidity needed to trade a larger volume of financial assets is possible because of endogenous bank credit creation without technical limits on money growth; and because of the dynamics in the hierarchy of money, where non-money assets can come to function as settlement medium during bouts of optimism, expanding effective liquidity. In this way, the boom is increasingly driven by financing rather than money, let alone real factors. And it ends when investors start doubting repayment probabilities, or when the monetary authorities intervene by raising interest rates , quantitative tightening (selling assets) or introducing regulations (Minsky, 1986).

During the boom, there is a tendency for investor sentiments to carry financial investments into overshoot. While the destabilizing effects of this have captured most of the attention of analysts, there is another consequence. Because of the political economy of interventions that never completely write down excess debts (Minsky 1986, ch 9), every new boom starts at a higher level of wealth and debt. The result is a secular increase in assets and liabilities relative to production and income, and a decreasing correspondence between financing and production, as noted in the previous section. This decoupling of financial structures from incomes and output, and from physical reality, is a key aspect of financialization (Palley, 2014, vd Zwan, 2018).

This explains why finance – which is the total value of the hierarchy of money; all assets and liabilities combined – grows and fluctuates increasingly if financial markets are unregulated. Financial 'total returns' (yields plus capital gains) attract more financing, and endogenous bank money and shadow money creation respond to facilitate this. This occurs in a spontaneous, decentralized, and evolutionary manner. It is part of the innate dynamics of capitalist finance, designed by no one but taken part in by everyone. Its result, as we have seen, is that the first part of the double coincidence assumption fails:

growth of finance does not translate to corresponding growth of money spent on investment.

The other part of the explanation why the double coincidence assumption fails must address this link to (and the impact on) productive investments. Why does productive investment not move along with the ups and downs of financial investment? (Figure 2). Why is there 'financial slippage' - ever more debt used to produce the same output?

6 Why the double coincidence assumption fails: finance is not investment

The answer to this also lies in the monetary nature of capitalism. Investors pursue monetary total returns, which is yield plus capital gains. Whether the yields are based on productivity growth and profit, or on financial returns made possible by increased borrowing, is not something the investor can know –especially not in large, liquid and impersonal markets. Thus, there is no reason why financial investments should move in sync with real-sector investment and productivity gains, or with greening of production structures. They move in sync with financial and property markets – which may or may not support investment.

In fact, there is a built-in tendency for financial investment to move increasingly *away from* real-sector investments. This is because they are subject to different drivers; the economy is a 'two price' system (Minsky 1975). Assets prices drive financial markets, prices of goods and services shape real-sector markets. The 'instability of capitalism is upward' (Minsky 1980) because without impediments, self-propelled financial investment will soon outgrow the economy's capacity to absorb finance productively. That productive absorption of savings is no necessity at all is also clear from Figure 1. Household and business savings (arrows 4 and 5 on the right) may lead to total returns that are re-invested in the financial and property markets (arrow 4 on the left).

There is only so much additional demand for output even with vigorous advertising; there are limits to the availability of inputs; and production is a time-consuming process with modest returns. Once production has run up against these limits, ongoing financial investments, generated by borrowing in expectations of high returns, then starts flowing into real estate and financial markets, where those returns can be realized. Unlike production processes, there are no limits to how fast and how high asset prices can rise.

That this happens is not accidental but built into the fabric of capitalism, given optimistic expectations that are expressed in endogenous liquidity creation.

Greenwood and Scharfstein (2009) captured this expansion of finance without an expansion of GDP for the US in a 'Credit Intermediation Index' based on data from 1980 to 2007. The Credit Intermediation Index is the ratio of gross credit to net credit to end users (government, households and nonfinancial firms). This index was stable in the 1980s around 1.7, then rose to a plateau of 2.2 from 2002. 'On top of' the rise in liabilities of end-users in the real sector, there was steep growth of borrowing between financial institutions, in an increasingly complex environment. This means, first, that 'finance is not money' (as discussed in the previous section). Second, (growth of) finance is not (growth of) investment, because there is much credit that never reaches material investment processes.

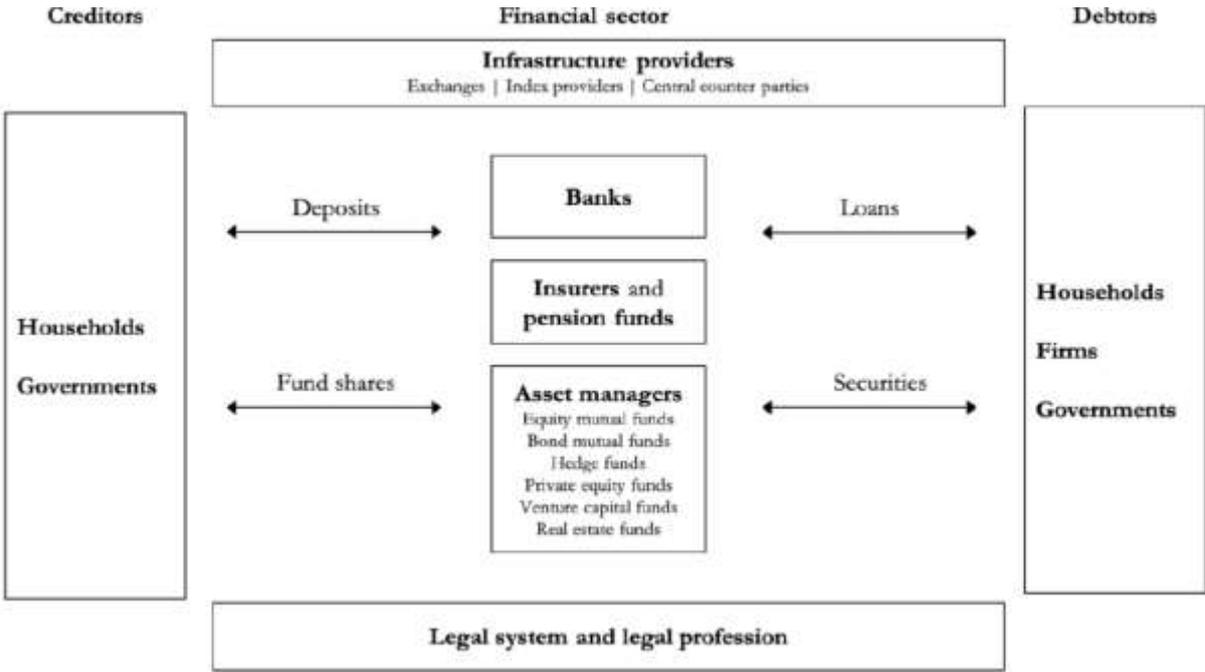
The result of this dynamic is Minsky' famous Financial Instability Hypothesis, which explains why instability is no accidental but inherent in capitalism. But equally, it is an explanation of the inherent rise in finance for non-productive investment –or the 'debt shift' (Bezemer et al 2020) that was apparent in Figure 2 and which as been noted in many other studies (Jordà et al, 2015; Kuvshinov and Zimmermann, 2015). If financial and real-estate assets and liabilities increase faster than produced and productive assets, the economy's debt is shifting away from productive uses. There can be low real investment and abundant financial investment.

This is financialization, or 'assetization' (Birch and Muniesa 2020), where financial assets become the object of attention for investors, rather than output, productivity or even profit. This is why in deregulated financial markets, debt grows relative to GDP and asset market rise relative to output. The GDP growth correlation of financial liabilities (bank loans, bonds and other liabilities) has been falling since the 1990s, when financialization took hold (Arcand et al 2015; Bezemer et al 2016). It also explains why additional financial investment labelled 'sustainable' or 'green' may not make a dint in dirty production. Total returns on sustainable finance assets may be realized and green bonds markets may expand without necessarily an expansion of clean production.

As assetization and rentierization dynamics gathered pace, financial markets have become increasingly complex. Financial complexity is implied in the process of

increasing financial investments without material investment. New issues in share markets and corporate bond markets are not large enough to satisfy the demand for investing the liquidity that is generated by borrowing and redirecting incomes (e.g. in pension funds) for investment, so that funds of funds, derivatives, securitized loans and other new financial instruments are invented to become new investible classes.

Figure 3: the complexity of the financial system



Source: Braun and Koddenbrock (2022:8)

So while the sheer quantity of finance already indicates that this cannot possibly lead to comparable expansions of investment, a second reason why this cannot be ascertained is complexity. Between ultimate borrowers on the left-hand side of Figure 3 and ultimate lenders on the right hand side, there are not just banks and (share or bond) markets. The savings of lenders move between banks, markets and asset managers along complex trajectories, before they are held by some ultimate borrower which may or may not be a productive firm building up greener production structures. Can certification schemes really know the final use of liquidity that is ‘invested’ in the financial system? For instance, when pension funds divest brown assets this will be registered as a greening of the financial system. What is not registered in such metrics is that the assets are in all likelihood purchased by a private equity house such as Blackstone - a firm absent in the

Glasgow Financial Alliance for Net Zero- which through a fund called Arclight Capital owns the Ohio coal plant which was one of the ten worst emitters of greenhouse gases in 2019 according to the Environmental Protection Agency (Seidmann et al 2022:7). Blackstone sponsored energy-focused funds which raised nearly \$20 billion since 2012. Yet other complications in tracing impact is the use of brown assets as collateral for funds that finance green projects; brown loan portfolios shed by banks which are bought up by private equity and hedge funds, and securitization which moves financing off balance sheet (Kedward et al, 2022:12).

Beyond these specifics, it is generically attractive to recycle savings multiple times within the global financial ecosystem, driving up the credit intermediation index, is or a number of reasons. These include profit from securitization and collateralization, risk management by slicing and dicing, the operations of funds of funds, and transactions-based remuneration policies. Then there

There are positive feedbacks between complexity and financial slippage. This is so because financial slippage requires a narrative that obfuscates it, so that investment can still be rationalized in terms of material impacts (perhaps in sustainability-enhancing impacts). It is helpful if an instrument is more complex, or part of a more complex environment, so that the narrative cannot be dispelled so easily. It is harder to ascertain the final use of more complex products or chains of investment vehicles.

Of course, the narrative around financial instruments is not about these loops (arrow 4 in Figure 1). The narrative refers to its risk and returns and to its presumed real-sector uses, even as it becomes increasingly unlikely that the rising volume of finance can in fact be absorbed in the real sector, and even as the complexity of instruments and markets makes it ever harder to even know. Therefore, fraud is also inherent in every financial boom, as Black (2005) has documented, and 'innocent frauds' – a system's consensus beliefs which, even though untrue, support the system - are pervasive (Galbraith 2004). All business schools teach that finance supports investment and productivity and that invested money must axiomatically find its way to the real sector ultimately. Each new financial product is launched with reference to profit, production, health, sustainability and other good real-sector outcomes. The bigger the boom, the more enthusiastic such innocent frauds are embraced, the more financial slippage and

market complexity there is. Markets are not always in a boom, but complexity supported by innocent frauds tends to persist from one cycle to the next.

Finally, the monetary theory of production, and particularly its elaboration in Modern Monetary Theory, points to another reason for divergence between private-market financial expansions on one hand and growth of investment on the other hand. Not only private parties create money and near-monies; also treasuries and central banks do. Treasuries may or may not spend sufficiently into the real sector to maintain real investment levels (e.g. Kelton 2020). In the double coincidence assumption, it is as if investment spending is fully outsourced to the private sector. In reality, deficit spending is a sizeable contribution to investment.

It bears repetition that this does not just concern public investment but also aggregate private investment, spurred by expected profits supported by public spending, per Kalecki (1943) and Keynes (1936). Capitalism is profit-driven, but the monetary theory of production (Figure 1) shows that profitability is not determined by private investment only. Aggregate profit results from aggregate (public and private) spending, with private investment resulting from (expected) effective demand and public investment resulting from the government's public policy goals, the structure of public finances (e.g. automatic stabilizers), electoral considerations, and exogenous influences (geopolitics, pandemics etc.).

The implication is that private finance may be impotent to effects investment if public spending falls short of the level requires to maintain profit expectations. This is not just a quantitative issue of sufficient spending to monetize profit, but also a qualitative challenge of creating and maintaining stable profit expectations – e.g. by formulating long-term strategic investment programs (Mazzucato 2014). Instead, current central bank policies are predicated on the effects that run through arrow (8) in Figure 1, from central banks to financial and property markets, hoping to lower the relative yields and borrowing costs for 'green' companies and sectors (Kedward et al 2022:7). But in a sea of liquidity giving rise to financial slippage, and with potentially violent changes in liquidity due to market-based banking, the effectiveness of these policies is unclear.

This second problem with the double coincidence assumption – that finance is not investment - connects to a deep divide in theoretical thinking about finance and

development. Schumpeter (1912[1934]) emphasized that credit and finance is *not an input into production*. It finances inputs into production. But the subsequent literature (summarized in Levine, 2005) which treated finance as a ‘financial service’ paved the way to treat it like other goods and services as an input into production. From there, it is only a short step to take an exogenous money view, where finance (like other inputs) is a causal factor in the growth and transformation of output. Schumpeter’s central point that ‘development = credit + entrepreneurship’ was lost. It is mission, vision, ideas and innovations by private entrepreneurs (and entrepreneurial states; Mazzucato, 2014) which draw finance to projects. Without this, there can be growth of finance but it will become a glut, with central banks pushing on a string move private finance into the desired direction.

This section has shown that between SF and material change, there is not only the difference between finance and money. There is a second layer of indeterminateness. Not all finance is assets and liabilities in support of material investment – in fact, most is finance for finance. The theory of the monetary production economy (Graziani 2003) clarifies the functional difference between finance for investment (‘initial’ finance) and ‘final’ finance, or savings (financial and real estate investments). This undermines the other part of the double coincidence assumption, that all (addition to) finance leads to (additions to) productive investment. In the original monetary production economy, initial and final finance could be mapped onto banks and markets. Today in the era of market-based banking (Howarth and Hardie 2013), much of what banks do is recycling and enlarging final finance. This means there is no ‘funding gap’ that could explain material under-investment by lack of money, but rather a problem of too much final finance and too little initial finance; too much money and financial assets and debt, and too little material investment. Can it be different? This is the subject for the next section.

7. Wither Sustainable Finance - (TO BE DEVELOPED)

Fostering real investment

The aim of sustainable finance is investment, both private and public. Greening the economy has to be done through investment (and behavioural change, which falls

outside this paper). Since private investment is ruled by sentiment (arrow 6), then creating long-term expectations of profitability in sustainable production is needed to direct private finance there. Part of this can be done by pricing (carbon pricing, subsidies and taxes) but prices are uncertain levers on output (Kaldor, 1985), which render them suboptimal especially with binding carbon budgets.

Creating long-term expectations of profitability is also done by government investment in public goods, for instance in the infrastructure that the private sector needs to produce greener (the electricity grid etc.). Another and perhaps the most substantial contribution that public sector actors can make is ‘mission’: long-term, dependable, and clearly directed policy plans for impact. This is ‘market-shaping’ - reducing uncertainty, providing direction and resolving private coordination – rather than ‘market-fixing’ policies, which take market outcomes as given (Mazzucato and Ryan-Collins, 2022).

If much of SF thinking is currently beholden to a mistaken ‘funding gap’ notion originating in development thinking, SF theory should take another leaf out of the development economics textbook: systemic development, including the green transition, is rife with coordination problems (e.g. Matsuyama 1998) which requires public coordination and investment. Rather than calculable risks and returns that may characterize incremental adaptation, the fundamental uncertainty inherent in systemic change means that there may not be a quantifiable business proposition that attracts private investors – even though the longer-term (social and private) of the investment are positive beyond doubt. This is a widely applicable theoretical argument for market-shaping public initiatives, also on the financing side of the green transition, and especially where this requires long-term and ‘patient’ capital (Deeg and Hardie 2016; Kedward et al 2022:13).

To sustain private investment generally (so that it can be directed to green purposes), total returns need to be maintained. It is tricky to do this by QE and repo policies, since that requires low rates, leading to more debt and more inequality, and to ‘financial dominance’ (Brunnermeier, 2016) which constrains both fiscal and monetary policy. Public policy must shift to maintaining private profit and wages through arrow 3, by more public investment and encouraging of private investment. This moves the system away from financial dominance or even monetary dominance, to real dominance (not

just fiscal – real is public and private) credible threats, pricing, maybe capital requirements for non-financial risks.

For the same reason, it is imperative to find way to reduce arrows 4 and 5 in Figure 1: business and household saving that lead to financial investment but not real investment. More goes into the security markets than is taken out for investment, with consequences for debt levels, complexity and instability. How to reduce this? Discourage stock buybacks, M+As and quarterly capitalism; rethink funded pensions. Etc.

Set up real economic targets instead of (only) financial targets - example sustainability-linked loans. Tie investments to sustainability (real economy) objectives (and ring fence those investments) in the form of KPI indicators. See green or sustainable bonds, but also impact finance with clear real economic goals (and additionality).

In relation to real economy (and sustainability), ‘going down the hierarchy’ means less effect on the real economy. Sustainable finance should mean using only instruments closer to the top of the finance pyramid? So restrict instruments used for sustainability to those high in the hierarchy. (However also very liquid instruments can nominally be for a purpose but just create financial wealth - dot com bubble and shares, corporate bonds financing payouts).

Finally, directive credit policies (Bezemer et al, 2021) coupled to government investment and mission (see below) will help to prevent financing bottlenecks.

Taming instability

The instability of private investment which undermines steady green investment flows is due to the dynamics of the hierarchy. This is inherent in financial markets but its excess is not. Institutional arrangement may exacerbate that dynamics, increasing market elasticity at the cost of market discipline (Mehrling 2013), for instance when central banks underwrite markets in asset purchase programs and collateral frameworks (Gabor 2016). Put institutional floors and ceilings in the macroeconomic system – this goes beyond finance only (Dafermos et al, 2021). Do not increase liquidity that turns into shadow money (reduce repo collateral dependence and QE), discourage financial ‘innovation’ which destabilizes real innovations (how?).

Provide support for the assets and liabilities higher up the hierarchy – those are more accessible to public policy (because closer to public issuers?), there is less financial slippage, and liquidity growth there is more difficult to reverse leading to instability. So discourage market-based banking (arrow 2) both on the asset side (securitization of loans) and the liability side (non-deposit funding) so that market instability (which is unavoidable) does not easily spill over to banking instability; and so that loans for investment may increase as market-based banking (2) decreases.

Private and public responsibilities

The idea of state ‘interference’ is a non-starter analytically; states - central banks, treasuries and governments - are organically involved in money, finance, profit and investment from the start.

Aggregate profit results from aggregate (public and private) investment, with private investment resulting from effective demand and expectations. Since these are not stable, there is a continuous role for governments to create and direct effective demand (perhaps away from brown projects and towards green projects) and to guide expectations by formulate a long-term vision and putting the monetary power of Treasuries and central banks behind it. Governments in this way have a market-shaping role, solving private-market coordination problems - something which goes beyond fixing market externalities.

Beyond the monetary flows that define the monetary circuit, there are the liabilities and assets that make the flows possible, and the asset markets on which their values and returns are determined. Therefore alongside the monetary circuit of profit, investment and effective demand, there is the financial circuit of returns on assets and capital gains, intersecting with the monetary circuit. Financial investors do not distinguish between the two. They follow the highest ‘total’ return (yield plus capital gains).

This implies two broad roles for states. Treasuries can engage in market-shaping material investments that draw in and direct private capital, making production greener. Central banks can engage in market-making asset purchasing and dealing, supporting the financial returns and capital gains linked to the greening economy and abstaining

from underwriting financial 'innovations' that merely create a financial overgrowth on the economy's productive structures, or actively finance the brown economy.

8. Reflections and conclusion (to be completed)

REFERENCES

- Amundi and IFC. (2012) Amundi Asset Management and International Finance Corporation) Emerging market green bonds report, 2020. Washington, D.C.
- Arcand, J E Berkes and U Panizza (2015) Too Much Finance, *Journal of Economic Growth*. 20 (2): 105–148. doi:10.1007/s10887-015-9115-2.
- Banga, j (2019) The green bond market: a potential source of climate finance for developing countries. *Journal of Sustainable Finance Investment*, 9:1:17–32
- Bezemer, D., J Ryan-Collins, F van Lerven, F. & L. Zhang (2021) Credit policy and the 'debt shift' in advanced economies. *Socio-Economic Review*
- Birch, K and F Muniesa (ed.) (2020) Assetization: Turning Things into Assets in Technoscientific Capitalism. Cambridge, MA: The MIT Press
- Boissinot, J., Goulard, S., Le Calvar, E., Salin, M., Svartzman, R. and Weber, P.-F. (2022). Aligning financial and monetary policies with the concept of double materiality: rationales, proposals and challenges. LSE Grantham Research Institute on Climate Change and the Environment. <https://www.lse.ac.uk/granthaminstitute/publication/aligning-financial-and-monetary-policies-with-the-concept-of-double-materiality/> Accessed 17 October 2022.
- Black, W (2005). Control frauds' as financial super-predators: How 'pathogens' make financial markets inefficient. *Journal of Socio-Economics*. 34 (6): 734–755. doi:10.1016/j.socec.2005.07.026
- Bonizzi, B and A Kaltenbrunner (2020) Critical macro-finance, Post Keynesian monetary theory and emerging economies. *Finance and Society*, 2020, 6(1): 76-86
- Braun, B and K. Koddenbrock (2022) Introduction. In: Braun, B and K. Koddenbrock (eds.) Capital claims: The power of global finance. Routledge.
- Brunnermeier, M (2016). Financial Dominance. Rome: Banca d'Italia. <https://scholar.princeton.edu/markus/publications/financial-dominance> accessed 10 October, 2022, 2022
- Busch, T, P Bruce-Clark, J Derwall, R Eccles, T Hebb, A Hoepner, C Klein, P Krueger, F Paetzold, B Scholtens & O Weber (2021) Impact investments: a call for (re)orientation *SN Business & Economics* volume 1:33
- Carney, M(2021) COP26: 'Not blah blah blah', <https://news.un.org/en/story/2021/11/1104812>, accessed 10 October, 2022, 2022

- CBI. (Climate Bonds Initiative) Climate bonds standard version 3.0., 2019. <https://www.climatebonds.net/files/files/climate-bonds-standard-v3-20191210.pdf> . accessed 10 October, 2022, 2022
- Chenet, H, J Ryan-Collins F van Lerven (2021) Finance, climate-change and radical uncertainty: Towards a precautionary approach to financial policy *Ecological Economics* 183, doi.org/10.1016/j.ecolecon.2021.106957
- Christophers, B (2019) The rentierization of the United Kingdom economy. *Environment and Planning A: Economy and Space*, September, 2019:1-33
- Climate Bonds (2022). <https://www.climatebonds.net/certification>. accessed 10 October, 2022, 2022
- Gabor, D (2016) The (impossible) repo trinity: the political economy of repo markets. *Review of international political economy* 23(6): 976-1000
- Kuvshinov, D and K Zimmermann (2015) The big bang: Stock market capitalization in the long run. *Journal of Financial Economics* 145 (2), 527-552
- Heine, D, W. Semmler, M. Mazzucato, J. P. Braga, A. Gevorkyan, E. K. Hayde, and S. Radpour. Financing low-carbon transitions through carbon pricing & green bonds. *World Bank Policy Research Working Paper*, 8991,, 2019.
- Dafermos , Y, D Gabor, J Michell, S Newman and K Ruziev (2022) ‘About critical finance’, on <https://criticalfinance.org/about/>. Accessed 8 October, 2022.
- Daniela Gabor, D (2021) The Wall Street Consensus. *Development and Change* 52:3 pp 429-459. doi.org/10.1111/dech.12645
- Deeg, R. and Hardie, I. (2016). ‘What is patient capital and who supplies it?’ *Socio-Economic Review*, 14(4), pp.627–645
- Dutta, S.J., Kremers, R., Pape, F. and Petry, J. (2020) Critical macro-finance: An introduction. *Finance and Society*, 6(1): 34-44.
- EC (2021) (European Commission) Proposal for a regulation of the european parliament and of the council on european green bonds. Strasbourg, 6.7.2021 COM(2021) 391 final, 2021/0191(COD),, 2021. https://eur-lex.europa.eu/resource.html?uri=cellar:e77212e8-df07-11eb-895a-01aa75ed71a1.0001.02/DOC_1&format=PDF . accessed 10 October, 2022, 2022
- Flammer, C (2021) Corporate green bonds. *Journal of Financial Economics*, 142: 499–516,, 2021a.
- Gabor, D (2016) The (impossible) repo trinity: the political economy of repo markets. *Review of International Political Economy* 23 (6)
- Gabor, D (2020) Critical macro-finance: A theoretical lens. *Finance and Society*, 2020, 6(1): 45-55
- Galbraith, JK (2004) The Economics Of Innocent Fraud. London: Penguin Books
- Gorton, G and A Metrick (2012) Securitized banking and the run on repo. *Journal of Financial Economics* Volume 104, Issue 3, June, 2012, Pages 425-451
- Graziani, A (1989) Theory of the Monetary Circuit. *Thames Papers in Political Economy*, spring issue,1-26. Reprinted in Musella, M. & Panico, C., (eds.), (1995), The Money Supply in the Economic Process, Edward Elgar,Aldershot

- Graziani, A. (2003) The Monetary Theory of Production. Cambridge: Cambridge University Press.
- Greenwood, R and D Scharfstein (2013) The Growth of Finance, *Journal of Economic Perspectives* 27(2): 3-28
- Hardie and Howarth (2012), "Framing Market-Based Banking and the Financial Crisis", chapter 2 in: Market-Based Banking and the International Financial Crisis pp 22-55 (24 pages, see 'Reading Materials')
- Haskel, J and S Westlake (2018) Capitalism without Capital: The Rise of the Intangible Economy. Princeton University Press.
- ICMA (2022). (International Capital Market Association) Analysis of the amendments to the EUGB regulation proposed by the rapporteur of the eu parliament. <https://www.icmagroup.org/assets/ICMA-update-to-its-analysis-of-the-EuGB-Regulation-05012022.pdf> . accessed 10 October, 2022, 2022
- ING (2022) Sustainability-linked loans. <https://www.ingwb.com/en/sustainable-finance/sustainability-linked-loans> , accessed 10 October, 2022, 2022
- Ingham, G (2010) The Nature of Money. Wiley
- Ingram, G and R Mosbacher (2018) Development finance: Filling today's funding gap. <https://www.brookings.edu/research/development-finance-filling-todays-funding-gap/> accessed 10 October, 2022, 2022
- Jordà, O, K Knoll, D Kuvshinov, M Schularick & A M. Taylor (2015) The Rate of Return on Everything, 1870–2015. *The Quarterly Journal of Economics* 134 (3), 1225-1298
- Kedward, K., Gabor, D. and Ryan-Collins, J. (2022). Aligning finance with the green transition: From a risk-based to an allocative green credit policy regime. *UCL Institute for Innovation and Public Purpose, Working Paper Series* (IIPP WP 2022-11).
- Kaldor, N (1985) Economics Without Equilibrium. M.E. Sharpe
- Kalecki, M (1971[1943]) Selected Essays on the Dynamics of the Capitalist Economy: 1933-1970. Cambridge University Press.
- Kelton, S (2020) The Deficit Myth: Modern Monetary Theory and the Birth of the People's Economy. PublicAffairs.
- Keynes, JM (1933) "A Monetary Theory Of Production" In: Der Stand und die nächste Zukunft der Konjunkturforschung: Festschrift für Arthur Spiethoff. Munich: Duncker & Humboldt, pp.123-25.
- Keynes, JM (1936) The General Theory of Employment, Interest and Money.
- Koddenbrock, K (2019): Money and moneyness: thoughts on the nature and distributional power of the 'backbone' of capitalist political economy, *Journal of Cultural Economy*, doi 10.1080/17530350.2018.1545684
- Lavoie, M (2014) Post-Keynesian Economics: New Foundations. Cheltenham: Edward Elgar.
- Levine, R. (2005). Finance and growth: theory and evidence. In: Aghion, P. & Durlauf, S., eds., Handbook of economic growth. Volume 1A, pp. 865-934. Amsterdam: Elsevier B.V.

- Almeida, M. Global green bond state of the market, 2019. Climate Bonds Initiative, pages 1–16,, 2020. https://www.climatebonds.net/system/tdf/reports/cbi_sotm_2019_vol1_04d.pdf accessed 10 October, 2022, 2022
- Matsuyama, K (1998) Economic Development as Coordination Problems. Ch 5 (pp 134–160) in : Aoki, M et al (ed.) et al (1998) The Role of Government in East Asian Economic Development: Comparative Institutional Analysis. Oxford Academic
- Mazzucato M (2014) The Entrepreneurial State: debunking public vs. private sector myth. Penguin
- Mazzucato M, Ryan-Collins J (2019) Putting value creation back into "public value": from market-fixing to market-shaping *Journal of Economic Policy Reform*, DOI: <http://dx.doi.org/10.1080/17487870.2022.2053537>
- Mehrling, P (1999) The Vision of Hyman P. Minsky . *Journal of Economic Behavior & Org.* 39 (1999) 129–158
- Mehrling, P (2013) The Inherent Hierarchy of Money. Chapter 21 in: L Taylor, A Rezai, and T Michl (eds.) Social Fairness and Economics. Economic Essays in the Spirit of Duncan Foley. Routledge.
- Minsky (1978) The Financial Instability Hypothesis: A Restatement. *Thames Papers in Political Economy*, Autumn 1978.
- Minsky, H (1975) John Maynard Keynes. New York: McGraw Hill
- Minsky, H (1980) Capitalist Financial Processes and the Instability of Capitalism. *Journal of Economic Issues*, 14(2): pp. 505-523
- Minsky, H.P. (1986) Stabilizing an Unstable Economy. New Haven, CT: Yale University Press.
- Murau, S and T Pforr (2020) What is money in a critical macro-finance framework? *Finance and Society*, 2020, 6(1): 56-66
- Palley, T (2013) Financialization: The Economics of Finance Capital Domination. London: Palgrave McMillan
- Perez, C(2002) Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages. Cheltenham: Edward Elgar.
- Pettifor, A (2022) Grain Inflation: Starve the Poor, Feed the Rich. https://annpettifor.substack.com/p/grain-inflation-starve-the-poor-feed?utm_source=email&publication_id=259111&post_id=65490768 accessed 10 October, 2022, 2022, 2022
- Prasad, E, R Rajan and A Subramanian (2007) Foreign Capital and Economic Growth. *NBER working paper* 13619, DOI 10.3386/w13619
- Robinson, J (1952), The Generalization of the General Theory, The Rate of Interest and Other Essays. Macmillan, London.
- Sachs, J, W Woo, N Yoshino, and F. Taghizadeh-Hesary. Why is green finance important? *ADBI Working Paper Series*, 917,, 2019.
- Schumpeter (1912/1934) The Theory of Economic Development. An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle. Harvard University Press.

Seidman, D., Mehta-Neugebauer, R., Giachino, A. and Mendoza, A. (2022). Private Equity's Dirty Dozen: 12 firms dripping in oil and the wealthy executives who run them. https://pestakeholder.org/wp-content/uploads/2022/02/PESP_LS_PrivateEquityDirtyDozen_Feb2022-Final.pdf. accessed 17 October, 2022

Tooze (2018) https://adamtooze.com/2018/07/05/framing-crashed-ii-2008-the-crisis-of-the-national-macroeconomics-and-the-revolution-of-macrofinance/?utm_source=substack&utm_medium=email . accessed 10 October, 2022

Whalen, C (1999) Post-Keynesian institutionalism: past, present, and future. *Evolutionary and Institutional Economics Review* 17(2). DOI:10.1007/s40844-019-00150-4

Woetzel, J, J Mischke, A Madgavkar, E Windhagen, S Smit, M Birshan, S Kemeny, and R Anderson (2021) The rise and rise of the global balance sheet: How productively are we using our wealth? McKinsey Global Institute.

Wray, R (2015) Modern Money Theory: A Primer on Macroeconomics for Sovereign Monetary Systems. London: Palgrave MacMillan.