The financialisation and governance of infrastructure
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1. Introduction

The financialisation of infrastructure is a growing phenomenon, encompassing the privatisation of its ownership and the financing and operation of infrastructure. But while financialisation – defined as the growing influence of capital markets, intermediaries and processes in economic and political life (Pike and Pollard 2010) – has provided an environment for private actors to widen and deepen their engagement with public infrastructure assets and systems, the governance of infrastructure financing continues to encompass an enduring and pivotal role for the state at the national and sub-national scales (O'Neill 2013; Strickland 2014; Ashton *et al.* 2014). Furthermore, geography remains an integral feature of the complex processes of infrastructure financialisation and its governance evident in the different legal structures, regulatory regimes and operational requirements that exist at different scales across the world (Allen and Pryke 2013).

This working paper seeks to make a contribution to the growing conceptual and policy interest in the financialisation of urban infrastructure assets, systems and networks. Drawing in part upon empirical research conducted into the emergent and evolving governance of local infrastructure funding and financing in the UK, the key arguments in the paper are two-fold. First, financialisation is an uneven, negotiated and messy process rather than a monolithic juggernaut rolling-out in the same way everywhere in different geographical settings; and second, the role of the state at different scales has been reinforced rather than reduced in the context of the financialisation of infrastructure because of its particular, specialised nature.

Infrastructure has long been viewed as a public good or service, has high capital requirements, is often associated with statutory planning, property and land ownership issues that require consideration and sometimes negotiation to resolve, and in many major infrastructure schemes there can be substantial risks during the initial construction phase of a project that only governments are either able or willing to bear and underwrite the costs.

In exploring the uneven geographies of its financialisation and governance, it is useful, given its varied forms, to begin by defining what is meant by infrastructure. Dawson (2013: 1) offers a broad definition of infrastructure based on “the artefacts and processes of the inter-related systems that enable the movement of resources in order to provide the services that mediate (and ideally enhance) security, health, economic growth and quality of life at a range of scales”. Viewed through a financialisation lens, infrastructure is also increasingly seen by governments, private operators and investors as an alternative asset class alongside bonds, currencies, equities and so forth in the financial investment landscape (Inderst 2010).

An urgency has emerged for governments at all levels around the world to take steps to bridge the infrastructure gap between what the public and private sectors currently invest in infrastructure and what is needed to maintain, make more efficient or build new infrastructure to address a range of inter-related and complex economic, social and environmental opportunities and challenges, particularly in urban landscapes (OECD 2014). The global financial crisis, subsequent recession and sovereign debt crisis, has been accompanied by the introduction of new capital requirement reforms for banks and insurance companies, but has meant that increased market uncertainty has reduced the availability of ‘traditional’ public and private capital for infrastructure development (OECD 2014). This situation has pushed infrastructure funding and especially financing centre stage:

> [T]he world's insatiable demand for infrastructure will require the investment of trillions of dollars over the next four decades. While infrastructure poses many challenges for governments and developers, none are as urgent or as complex as the challenges of how to finance it (KPMG 2012: 2).

The result is that governments and private actors are exploring – as well as in some cases being compelled – to adopt (more) financialised practices and mechanisms in an attempt to leverage in new capital. When considering the financialisation of infrastructure, it is necessary to first differentiate between funding and financing (Table 1). The funding sources for infrastructure are relatively few, and tend to be derived from taxation, user fees or other charges. Financing refers to the financial models that organise how the revenue (or funding) sources are turned into capital.

Table 1: The Funding and Financing of Infrastructure

Funding:

- Relates to the revenue sources, often collected over a number of years, which are used to pay for the costs of the infrastructure.

Examples include:

- General purpose taxation.
- User charges.
- Other charges or fees dedicated to infrastructure.

Financing:

- Turns funding (i.e. the revenue sources) into capital that can be used today to build or make improvements in infrastructure. Project financing requires the predictability of funding to be in place over the lifetime of the project. Once this is in place finance (e.g. debt or equity) can be raised.

Source: Adapted from WEF (2014)

2. Financialising Infrastructure

The financialisation of infrastructure, which has a distinct geography, concentrated on urban and suburban areas (Graham 2000; Ottaviano 2008) is a growing feature

of the broader pattern of financialisation in the global economy. It is possible to identify distinct periods in the funding and financing of infrastructure, particularly at the local scale, which have shaped and continue to be shaped by the evolving nature of the political economy, technological changes and the recent growth and extension of urbanisation. In this section, we chart the changing context of how infrastructure is funded and financed. At various times, the public and private sectors have played different roles, meaning that it is possible to distinguish where and when the public sector or the private sector has been pre-eminent. Although there have been phases or periods of state-funded or market-led infrastructure provision, however, there has also been a long relationship between the state, in its different guises, and the private sector, through all the different stages of the infrastructure life-cycle. In recent years, this relationship has both widened and deepened as a condition of the recent emergence of infrastructure as a new investment or alternative asset class.

2.1 Changing context

A shift is apparent in the nature of infrastructure funding and financing and the respective roles of the public and private sectors:

> Traditionally, infrastructure investments have been financed with public funds. The public sector was the main actor in this field, given the typical nature of public goods and the positive externalities generated by such investments. However, public deficits, increased public debt to GDP ratios and, sometimes, the inability of the public sector to deliver efficient investment spending and misallocations of resources due to political interferences have led to a strong reduction of public capital committed to such investments. As a result of this increasing public capital shortage, in the past few years, the funding of infrastructure investment in projects characterised by high specificity, low re-deployable value and high intensity of capital has increasingly taken the form of project finance (OECD 2014: 6).

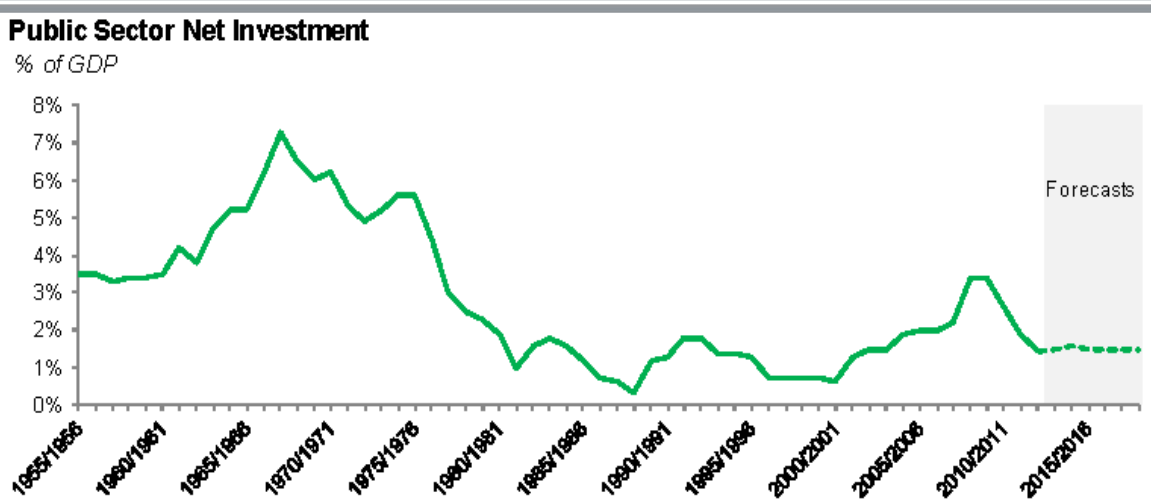
Historically, infrastructure has been regarded as ‘public works’ with the state playing a pivotal role in building and maintaining certain public goods and public institutions that often went beyond the capability and capacity of the private sector (O’Neill 2013, Smith 1976). However, O’Neill (2013) argues that infrastructure is neither, by its nature, a public or a private good. Rather, infrastructure has its own particular characteristics and has an integral role to play in creating and sustaining economic success and building attractive, functional urban landscapes. The state remains an inseparable partner in particular forms of infrastructure privatisation (such as utilities) through regulatory frameworks and property relationships, resulting in a more complex, uncertain and nuanced inter-connection between public and private sectors in infrastructure functions, purposes, funding, financing and governance (O’Neill 2009). Qualitative perspectives on the changing role of the state enable appreciation and understanding of the nuanced and enduring presence of the state in infrastructure planning, financing and delivery, and interrogation of the complex series of interactions that take place between public and private actors bound-up in the financialisation of infrastructure governance at different spatial levels (O’Neill 1997).

It is, however, possible to chart specific periods when the state played a leading and ‘senior’ role in the planning, funding, financing and delivery of infrastructure. Between 1850 and 1960, there was a general movement in cities in western Europe and the United States towards the development of centralised, monopolised, standardised and equalised infrastructure systems (Graham and Marvin 2001; Helm 2013), driven by prevailing Keynesian models of national state policy and demand management (Martin and Sunley 1997). This shift was framed within the context of widening individual access to services and employment, modernisation and societal progress, and was accompanied by an expansion of national state power. However, Graham and Marvin (2001) suggest that cities were different to the general trend, and that modernising urban places, which had embarked upon the development of

local infrastructure, were often typified by periodic processes of rupture, contradiction and inequality.

Sleeman (1953) felt that public infrastructure utilities were not commodities to be bought and traded in financial markets, but instead were assets considered essential to civilised life. Infrastructure was seen as the mechanism for binding the state together socially and spatially (Graham and Marvin 2001). Investment was primarily carried out by national governments, funded, in part, through debt and financed by sovereign bond issuance in the financial markets. Private institutional investors purchased these bonds through arms-length transactions and did not directly engage in investment selection (Hebb and Sharma 2014). As the economic, societal and technological shifts of the late 1960s and early 1970s put pressure on standardised infrastructure monopolies, liberalisation and privatisation began to erode the notion of the 'modern infrastructure ideal' (Graham and Marvin 2001). Whilst it is difficult to provide accurate statistics for total infrastructure investment in the UK and other OECD member states (HoC 2013; Vammalle *et al.* 2014), using UK Public Sector Net Investment (PSNI) as a proxy, total investment in the UK fell to 1.4% of GDP in 2012-13 (£22 billion), down from the peak of 7.1% in 1968, and is forecast to remain at around the same proportion of GDP until 2018-19 (Figure 1). This reduction is said in part to reflect the economic and social pressures facing the UK and other western economies at the time as governments embarked upon policies designed to reduce public sector fiscal imbalances, debt and borrowing requirements (Helm 2013).

Figure 1: UK Public Sector Net Investment



Source: House of Commons (2013)

In a privatised and liberalised environment, states have been trying to displace its responsibility for financing and providing infrastructure (Clark *et al.* 1999; Torrance 2008). For some, the privatisation of infrastructure represented an attempt to address a public accounting problem, resulting in the emergence of either outright privatisation or new forms of public procurement, such as the Private Finance Initiative (PFI) or Public Private Partnerships (PPP) (Helm 2013). PPPs had claimed to offer states the prospect of providing public service assets at a lower lifecycle cost (Wall and Connolly 2009), whilst keeping investment 'off the public sector balance sheet' (Spackman 2002). For others, the privatisation and liberalisation of infrastructure is a feature of an ideological blueprint where budgetary pressures are used as rationale for introducing smaller state settlements (Peck *et al*. 2013). Reflecting the continued role of the state in infrastructure funding, financing and governance, the public sector has remained an integral actor in initiatives, such as PPPs, given its role as an initiator, guarantor and regulator in contracts and agreements (Martinez-Lacambra 2013).

Private capital wielded by financial actors is discerning and increasingly seeks viable infrastructure projects that generate relatively stable, long-term returns and presents the lowest risks within investment portfolios. This process is said to have produced

an unbundling or splintering of the urban infrastructure system (Graham and Marvin 2001). As infrastructure assets are bought and sold by national and international financial investors, these institutions have, at the same time, widened and deepened their engagement in the governance of infrastructure at the local and urban scale (Torrance 2008). Whilst there has been an expansion of different types of PPP models (Hodge *et al*. 2010), particularly in the UK, problems have arisen as a consequence of the increased cost of capital to cover risk and as doubts emerge within the private sector as to whether consumers or taxpayers would be content to pay for future and on-going infrastructure investment (Helm 2013).

With the rise in state indebtedness and the advent of austerity, national governments claim that they have insufficient resources to maintain existing infrastructure assets or invest in new projects (Weber and Alfen 2010). And yet the financial crisis and resulting market paralysis, and the near implosion of the global banking sector, involve the same financial institutions that earlier invested heavily in PPPs. The credit impasse has given rise to a new role for the state in infrastructure planning, financing and provision, particularly in underwriting investment costs (through state subsidies or guarantees), in an effort to close the gap between the public and private costs of capital (Helm 2013). Although interest rates are at an historic low, in a bid by monetary policy institutions to stimulate and support economic recovery, public indebtedness and political decisions on fiscal consolidation via public expenditure reductions and tax increases have restricted the ability of governments to borrow from markets to invest directly in infrastructure (Bailey 2013). The irony is that the cost to the private sector of borrowing from financial institutions has always been higher than for governments given their relative stability and strength of their balance sheets in the northern and western European context, and the difference in the cost of finance for governments and for private companies will continue to be substantial (PwC 2014). In specific infrastructure projects, such as Crossrail in London or the new generation of nuclear power stations in the UK, where the risk to the private sector of financing investment exclusively is too great given the size of the projects

and the initial construction risks, the state is the critical actor in convening financial institutions and orchestrating the funding, financing and governance of such infrastructure.

Whilst the state retains such a key role, national and local governments are nevertheless looking to lever in additional private sector capital, using different mechanisms and practices, some of which – as we explain below – are increasingly financialised. Traditional private sector sources of infrastructure financing have been under stress since 2007/08, when fundraising fell, and the 'shadow banking sector' emerged and began to invest in infrastructure (Standard and Poor's 2013). Austerity and fiscal constraints on government spending, coupled with the challenges surrounding corporate investment strategies and the emergence of new banking regulations (particularly in Europe) designed to increase long-term capital investment, have focused attention on the search for an alternative asset class (OECD 2013). Until recently, institutional investors, such as banks and hedge funds, were the primary sources of long-term capital, with investment portfolios built around bonds and equities and an investment horizon tied to the long-term nature of liabilities. During the last decade, there has been a shift in investment strategies, with investment in bonds and alternative assets classes, such as infrastructure, increasing (OECD 2013).

2.2 Financialistion and infrastructure as an alternative asset class

In recent years, the nature and dynamism of contemporary capitalism has been shaped by debates about financialisation, a process driven by the opening up of capital markets and national economies to global institutions and investors (Christopherson *et al*. 2013). The growing influence of capital markets, intermediaries and processes in economic and political life has seen finance bound up with and normalised through a range of everyday activities (Pike and Pollard 2010). The point has been reached where financial intermediaries are now deeply

ingrained within the economic geographies of individuals and communities (O'Neill 2009). Economic geographers have called for greater attention to be paid to the impact of financialisation on space and place (French *et al*. 2011), and for finance to be injected into conceptualisations of economic geography to help provide a clearer analytical framework for understanding the nature of the geography of financialised economies (Benner *et al*. 2011; Engelen and Faulconbridge 2009; Lee *et al*. 2009; Martin 2011, Wójcik, *et al.* 2007). The ability of capital to create and monetise new asset classes is one of the most pervasive processes in an increasingly financialised economy (Leyshon and Thrift 2007). Infrastructure is not immune from this development and is increasingly seen as an asset that provides long-term, income-oriented investment returns (Solomon 2009).

Inderst (2011: 74) suggests that infrastructure as a new asset class (Table 2) typically refers to:

- Private equity-type investments, predominantly via unlisted funds.
- Listed infrastructure funds.
- Direct or co-investments in unlisted infrastructure companies.

The emergence of specialist infrastructure funds has seen private investors invest within the infrastructure sector without investing directly in individual infrastructure projects, which typically carry greater risk and require scale and capacity on the part of direct investors (Hildyard 2012).

Reflecting the call for greater geographical appreciation of how financialisation plays out across space and within different places, there is an uneven geography to institutional private investment in infrastructure, with the drivers for investment varying between different countries. Despite the national variegation, the current prevalence of low interest rates and stock market volatility means that institutional investors are looking for assets that generate the kinds of long-term, inflation

protected returns that pension and insurance fund investors are seeking (OECD 2013; CBI 2012; Llewellyn Consulting 2013):

> [I]nstitutional investors are taking different approaches to infrastructure investing. Behind the separate investment allocation to infrastructure lies the investor decision to consider infrastructure as an asset class in its own right. Pension funds with a dedicated allocation have a target allocation to the asset class as part of the total portfolio and access the investment largely through unlisted equity instruments (infrastructure funds or direct investment) (OECD 2013: 12).

Table 2: Key Characteristics of an Infrastructure Asset

Infrastructure investments tend to have the following characteristics:

- Essential services for the majority of the population and businesses, either relating to physical flows in the real economy (i.e. transport, energy, broadband) or to social goods (education, healthcare);
- Government either as a direct client (via fixed term concession) or highly proximate to the transaction (through economic regulation);
- Long term in nature (thus requiring long term finance);
- Stable cash flows, particularly where payments are based on availability rather than demand (which is often beyond the control of a given project); charges may be linked fully or partially to inflation;
- Natural monopolies, either due to network characteristics/capital intensity or government policy; and
- Generally low technological risk

These characteristics mean that infrastructure businesses can generally support high leverage on a long term basis with returns that are less volatile than other investments. Some investors do not consider infrastructure a separate asset class; others consider it an alternative to (say) covered bonds or sovereign debt.

Source: Inderst (2010)

The UK, Australia and Canada have been at the forefront of developing privately financed infrastructure investments (Weber and Alfen 2010). Australian pension funds have been pioneers of infrastructure investment since the early 1990s, and the Australian financial industry coined the label of infrastructure as an ‘asset class’

(Inderst and Croce 2013). Canadian pension funds are also some of the world's leading infrastructure investors, especially in the model of 'direct investing' (The Economist 2012), which involves the purchasing of equity without third party fund management facilitation. The three largest Canadian funds, which have invested over US$31.3bn of assets in infrastructure worldwide, possess the necessary scale and internal institutional capacity to undertake direct investment (Preqin 2012). In comparison, the UK led the development of new procurement models for infrastructure financing in the form of PPPs and PFIs, and has only recently begun to consider the prospect of expanding pension fund investment in infrastructure (The Smith Institute 2012).

There is substantial diversity in what is meant by infrastructure, which makes standardising the sector as a uniform asset class problematic (Hebb and Sharma 2014). Although governments and financial markets and investors see infrastructure as a new or alternative asset class, Inderst (2011) suggests that there is limited theory to support the proposition of infrastructure as a separate asset class because infrastructure assets themselves are heterogeneous, with different types of infrastructure having different economic characteristics and risk and return profiles. Instead, Inderst (2011) believes that a sector approach to investment may be more meaningful than a high-level aggregation of infrastructure projects and systems. Although this may be useful advice for actors in cities and local areas seeking to attract private investment in infrastructure, it also runs the risk of countering local development strategies that are seeking to create and strengthen inter-dependencies between infrastructure systems (iBUILD 2015).

There are financial downsides to infrastructure being defined as an asset class. In particular, for investors and those seeking investment there are high and often uncertain demands for capital, illiquid and high sunk costs, a shortage of patient capital committed to returns over the long term, alongside the complexity and transaction costs of dealing with governments and regulatory institutions. There are

also issues concerning how viable and attractive in reality infrastructure as an asset class actually is or will be to pension and insurance funds. For example, there are restrictions on the percentage total of assets that some pension and insurance funds can invest in infrastructure. This means that only a fraction of total pension and insurance funds can be allocated for infrastructure projects (Reuters 2013).

The geography of finance suggests that, while financialised infrastructure investment offers the opportunity to link retirement savings to the development, success and physical vitality of cities, the need to generate profit results in an uneven geography, with an improvement for some urban areas, while others are left behind (Harvey 2006, 2010). In a financialised climate, city actors are compelled to speculate, and embrace greater risk, in order to prosper in the global urban hierarchy. The extension and intensification of financialisation in the wake of the global financial crisis (Lee *et al.* 2009) has enabled different places to develop innovative investment mechanisms to stimulate and support urban growth and development (Strickland 2011). The result is financialisation intensifying geographical disparities (Strickland 2011), reinforcing the uneven geographies of finance and its impact on local and regional development prospects.

3. Emergent Models, Practices and Governance in Infrastructure Funding and Financing

As infrastructure becomes funded and financed in increasingly financialised ways, different practices, tools, instruments and governance arrangements are either being modified or constructed in order to fund and finance local infrastructure. Actors in places are determining, shaping and reshaping how financialisation takes place on the ground, alongside other intermediary and capital market actors. Whilst the process of the financialisation of infrastructure is highly variegated (Strickland 2014), a number of characteristics can nevertheless be identified between and amongst different investment practices (Table 3).

A variety of different infrastructure funding and financing practices have emerged in recent years, many of which blur and/or straddle traditional notions of public-private boundaries (Table 4). Although this analysis provides a temporal perspective, suggesting that some practices, such as grants, are 'tried and tested', whilst other models are 'new and innovative', it would be problematic to think that there has been a fundamental break between different types of practice and that the current age is one dominated exclusively by innovative and more or less financialised arrangements. Different countries and cities are deploying similar or slightly different practices (some of which are hybridised) to identify and lever in investment, and, with financial pressures and fiscal stress mounting, no options are seemingly off the table.

Table 3: Characteristics of Financialised Investment Practices

1. The growing involvement of financial actors or intermediaries.
2. An increasing exposure of cities to – or dependence on – financial markets.
3. The increasing use of financial technologies, such as securitisation.
4. A reliance on a framework of financial calculation to predict, model and speculate against the future.
5. A transformation in the purpose, function, values and objectives of government, which are being brought in line with those of financial actors and institutions.
6. An increase in public sector indebtedness and risk taking.
7. The transformation of infrastructure from a physical and productive component of the urban environment into a financial asset defined by risk and return.
8. The increasing control over infrastructure by yield-seeking surplus capital.
9. The transformation of infrastructure into an engine for economic growth and tax base expansion.
10. The highly geographically uneven ability to engage successfully – if at all – in funding or financing infrastructure.

Source: Strickland (2014)

There are though, some subtle differences between traditional and emergent approaches to governing infrastructure funding and financing. Variations are evident when a comparison is undertaken of the specific dimensions to individual

approaches (Table 5). When considering rationales for investment, for example, there has been a noticeable shift amongst policy-makers towards seeking more direct and often greater economic returns on capital and infrastructure investment. Furthermore, there is a tendency for actors seeking investment and investors themselves to favour longer time-scales for investment, packages or projects or programmes that help to create scale and therefore involve larger schemes in terms of scale and scope. The geographies and governance of emergent approaches also tend to be broader, encompassing multiple local areas, in an attempt to provide the basis for pooling local resources, mitigating risk and co-ordinating strategic planning and collaboration across functional economic areas. There is also a growing recognition of the interdependency of infrastructure assets, systems and services in the sense of how specific 'items' of infrastructure, such as bridges and roads, when planned and delivered in an integrated manner, can shape physical development, city environments and economic growth.

Table 4: Infrastructure Funding and Financing Practices

Temporality	Type	Examples
Established 'Tried and Tested' ↓	Taxes and fees	Special assessments; User fees and tolls; Other taxes.
	Grants	Extensive range of grant programmes at multiple levels (e.g. federal national, province, state, supranational)
	Debt finance	General obligation bonds; Revenue bonds; Conduit bonds; National Loans Funds (e.g. PWLB).
	Tax incentives	New market/historic/housing tax credits; Tax credit bonds; Property tax relief; Enterprise Zones.
	Developer fees	Impact fees; Infrastructure levies.
	Platforms for institutional investors	Pension and Insurance infrastructure platforms; State infrastructure banks; Regional infrastructure companies; Real estate investment trusts; Sovereign Wealth Funds.
	Value capture mechanisms	Tax increment financing; Special assessment districts; Sales tax financing; Infrastructure financing districts; Community facilities districts; Accelerated development zones.
	Public private partnerships	Private finance initiative; Build-(own)-operate-(transfer); Build-lease-transfer; Design-build-operate-transfer.

Newer 'Innovative	Asset leverage and leasing mechanisms	Asset leasing; Institutional lease model; Local asset-backed vehicles.
	Revolving infrastructure funds	Infrastructure trusts; Earnback and Gainshare

Source: Adapted from Strickland (2014)

Table 5: Traditional and Emergent Approaches to Governing Infrastructure Funding and Financing

Dimension	Traditional approaches	Emergent approaches
Rationale(s)	Economic efficiency (and social equity) Market failure Managing urban (population) decline	Unlocking economic potential (e.g. GVA, employment) Releasing uplift in land and property values Market failure Managing urban (population) growth
Focus	Individual infrastructure items (e.g. bridges, rail lines, roads)	Infrastructure systems and services, interdependencies (e.g. connectivity, district heating, telecommunications) and resilience
Timescale	Short(er) 5-10 years	Long(er) to 25-30 years
Geography	Local authority administrative area	Functional Economic Area/Travel to Work Area city-region, multiple local authority areas
Scale	Targeted	Encompassing
Lead	Public sector	Public and/or private sectors (including international)
Organisation	Projects	Packages of projects (or programmes)
Funding	Grant-based (e.g. from taxes, fees and levies)	Investment-led (e.g. from borrowing, grant, revenue streams, existing assets)
Financing	Established and tried and tested mechanisms and practices (e.g. bonds, borrowing and PPPs)	Innovative mechanisms and practices (e.g. value capture, asset leverage and leasing, revolving funds)

Dimension	Traditional approaches	Emergent approaches
Process	Formula-driven allocation, closed	Negotiated, open
Governance	Single LA-based	Multiple LA-based (e.g. Combined Authorities, Joint Committees and Metropolitan Mayoralties)
Management and delivery	Single LA-based, arms-length agencies and bodies	Multiple LA-based, joint ventures and new vehicles

Source: Authors' research

Table 6: Characteristics of Financialised Investment Practices

Practice	Key Mechanisms	Financialised Characteristics	Insulation from Financialisation
Grants/taxes	Grant funding (often from higher-tier government)	In UK, capital grants dependent on macro-economic conditions. In US, states and Federal governments issue bonds, which determine available funds.	Limited financial engineering Funds linked to macro-economic performance and political choices

Practice	Key Mechanisms	Financialised Characteristics	Insulation from Financialisation
General Obligation Bonds (State and Local)	Issued by jurisdiction (US) that can levy a tax rate on real/personal property	Direct connection of taxpayers to financial markets Municipalities vulnerable to fluctuations in financial markets	Simple and transparent Democratic process
Revenue Bonds	Issued against specific revenue stream No recourse to general tax base Often requires ballot	Financialised engineering and creation of special purpose vehicles Policies designed to increase revenue	Cost of debt and ability to repay linked to characteristic and performance of asset
State Infrastructure Banks	Operates like a commercial bank Loans or credit enhancements Capitalised by state funds Recycle investments	State acts as financial intermediary Investors seek returns that generate profits that can be reinvested	Can help to overcome uneven geography of bank finance, and will determine location of investments
Tax Increment Financing (TIF)	In US, located in blighted area Bonds issued against future tax revenue, which incremental increases are used to service debt	Public sector speculation and indebtedness Dependent on asset value Public sector assumes risk	Risk can be mitigated by pay as you go approach

Practice	Key Mechanisms	Financialised Characteristics	Insulation from Financialisation
	In UK, operates as New Development Zones or Enterprise Zones	Speculative (and difficult) calculation of Business Rates, Borrowing against Business Rates requires appreciation of rental values and not asset value – which can leave local authorities with funding gaps and debt	Risk mitigation through stress testing and efficient debt service profile
Asset sales	Sale or lease of assets Infrastructure maintained or operated by the private sector Revenues from sales defined as capital receipts	Facilitates privatisation, segmentation and unbundling and financialisation of infrastructure Transformation from public good to revenue generation Shareholder value over public good Local government forgoes right to access revenue streams	Up-front cash for public sector and avoids debt
Self-financing expenditure	Unsupported or self-financing by local authorities borrowing (in the UK through the Public Works	Cost of debt is fixed to price of UK Government gilts	Debt available on demand Quicker and cheaper than bonds

Practice	Key Mechanisms	Financialised Characteristics	Insulation from Financialisation
	Loans Board – an agent of the HM Treasury, and part of the Debt Management Office (DMO))	PWLB rate set by the DMO	UK Prudential Code governs PWLB borrowing by local authorities
Private Financing	Private financing or the mobilisation of private finance Full divesture by public sector	Encourages the unbundling, segmentation and privatisation of infrastructure: creates the conditions for privatisation	Substitute for public sector investment and indebtedness
Public Private Partnership (PPP)	Credit guarantee financing and monetisation of public assets Special Purpose Vehicles created to lever in finance In US, PPPs require legislation to enable procurement and ability to issue toll revenue bonds	Explicit use of securitisation Risk/transfer to private sector Uneven geography	Nominally prevents public sector indebtedness Enables public sector investment in infrastructure
Local Asset Backed Vehicle (LABV)	Form of PPP Public sector contributes land and private sector cash into LABV Assets act as collateral against future borrowing	Securitisation is a key process in LABV Asset placed off balance sheet Future rental income used to leverage debt into redevelopment	Public sector already owns land Risk transferred to LABV Future asset value appreciation not essential

Practice	Key Mechanisms	Financialised Characteristics	Insulation from Financialisation
European Investment Bank	Direct project loans of up to 50% of project cost Structured finance Equity/financial investment Strict compliance with EU strategic objectives	Creditors seek to generate returns on infrastructure investment EIB uses vehicles such as private investment funds Financial engineering (EIB Project Bonds) Market conditions determine availability and cost of debt	Match funding needed

Source: Adapted from Strickland (2014)

Drilling down further into some financialised infrastructure funding and financing practices, using UK and US examples, Strickland (2014) has identified a series of mechanisms that lie beneath individual practices and which are both increasingly shaped and, in turn, insulated from financialisation (Table 6). In this analysis, it is possible to distinguish between those practices and mechanisms, such as grants and taxes, which feature limited, if any, financial engineering, and others, such as Tax Increment Financing (TIF) and PPPs, which contain explicit financialised characteristics predicated on more risky and speculative forms of development and the securitisation of assets. Significantly, whether more traditional or emergent, all of the practices have written through them deeply engrained and uneven geographies.

4. Uneven Geographies of Infrastructure Financialisation and Governance

Different infrastructure funding and financing practices are in operation in different countries and cities, shaping the uneven landscape of infrastructure financialisation and governance (O'Brien and Pike 2014). Whilst a literature on the economic and governance geographies of infrastructure is growing (see, for example, Hall and Jonas 2014; Haughton and McManus 2012; O'Neill 2009, 2013; Ward 2012; Weber 2010), much work remains to be done in mapping and explaining this emergent, dynamic and fast changing field. Empirical research can strengthen conceptual understanding of the geographic significance of particular financial models, particularly as actors in different places intensify the search for funding and financing mechanisms to support infrastructure development and operation. The following section outlines the uneven nature of evolving arrangements, drawing upon four illustrative examples where existing and new funding, financing and governance practices are evident: London, UK cities, United States and Australia. The analysis demonstrates that it is a misreading and simplistic interpretation to suggest that there has been a fundamental or linear shift or transition in developed and developing countries from state to market-led approaches in the financing of infrastructure (see

Table 7). This explanation is somewhat at odds with the view of other actors, including the World Bank:

> Over the last 20 years, private participation in infrastructure (PPI) has emerged to address infrastructure finance and efficiency shortfalls. Private provision is now the norm in the sub-sectors of telecommunications, ports and power generation, and a growing share of land transport infrastructure (World Bank 2012: p 5).

Instead, what is evident is the growth of a mixed array of ownership arrangements and different infrastructure funding and financing practices and mechanisms, many of which represent an attempt to address the challenges of reduced public and private funding and finance. These practices and mechanisms are exclusive to the state, some market-led, whilst others are deeply financialised and hybrid in nature, and in which the state *and* private capital are intertwined. At the same time, it is also important to draw a distinction between different elements of the infrastructure life-cycle, from design, build and finance through to operation and maintenance which have different and particular funding and financing needs, risk profiles and timescales (iBUILD 2015).

Table 7: Illustrative Examples of Uneven Geographies of Infrastructure Funding and Financing

Approach	**London**	**UK Cities**	**US**	**Australia**
1. State	Corporatist (London Underground, buses)	Municipal funding and financing of infrastructure systems – led by local	Road and water infrastructure supplied by state or local governments that raise	Major infrastructure assets (e.g. energy) funded by governments.

Approach	London	UK Cities	US	Australia
	Nationalisation and standardisation between 1930s and 1960s. TfL issued bonds for Crossrail finance. Austerity reducing state and city region investment.	authorities. Nationalisation and standardisation between 1930s-1960s. Possible LA Municipal Bond Agency. Austerity reducing state and local investment.	revenues and spend on public goods or overcoming market failure. Majority of publicly-owned infrastructure funded by tax revenues via bonds. Austerity and indebtedness reducing state and city investment.	Many assets and systems still owned and operated by public sector. Infrastructure bonds introduced in 1990s but abandoned. Federal and state governments reluctant to borrow for direct investment in infrastructure. Austerity reducing state and local govt investment.
2. Market-led	Large-scale privatisation of infrastructure in 1980s and 1990s. Complex PPP and Metronet in late 1990s, but collapse of Metronet in 2010. Transport for London bought out the tube lines in the	Expansion of PPPs and PFIs, particularly in soft infrastructure assets and systems, such as schools, waste, social and leisure services.	Most US households rely on privately-owned communications, energy and transport infrastructure. Emergent federal government interest in PPPs, which has been limited part of	Privatisation increased over the past 25 years. Australian variant of PPP introduced. Some notable failures such as Sydney Cross City Tunnel. Macquarie Infrastructure Model led the

Approach	London	UK Cities	US	Australia
	private consortia.		US infrastructure investment to date.	mobilisation and securitisation of earnings from once-state-owned infrastructure utilities in Australia, UK and Canada. Federal Government new infrastructure asset recycling programme. Further privatisation. Increased focus on user charging.
3. Hybrid (state and financialised)	State or public sector guarantees for private capital (e.g. Crossrail, NL Extension) Infrastructure funds (RIFs) (e.g. London Energy Efficiency Fund). Pension and insurance fund	'Business-type' City Deals. Investment-led approach. RIFs, Earn-backs, TIFs. Pension and insurance fund investment (debt and equity). Sovereign Wealth Funds. Regeneration Investment Organisation	TIFs. Mix of bonds and PPPs – e.g. Qualified Public Infrastructure Bonds as first type of bonds available for PPPs.	Interest in UK City Deals Link to proposal for Federal Government to shift from grants to incentivised models – i.e. something for something or deal-making approach. Local government

Approach	London	UK Cities	US	Australia
	investment (debt and equity). Sovereign Wealth Fund. Crossrail 2 funding options. TfL as a property developer to fund transport infrastructure. Fiscal decentralisation.	seeking FDI in UK infrastructure. Fiscal decentralisation.		seeking to introduce more value capture mechanisms. Pension and insurance fund investment (debt and equity). Sovereign wealth investment through state investment vehicles, such as Queensland Investment Co. Government to provide minimum revenue guarantees for a defined period. Call for great fiscal decentralisation to states and cities.

Source: Authors' research

4.1 London

In the nineteenth century, local government provision of infrastructure in the UK was the norm, mainly in water and sewerage, whilst in the twentieth century city

authorities, including London, provided water, electricity, gas and transport services (Helm 2013). From the end of the Second World War to the late 1970s, infrastructure funding and financing in London followed a model whereby the local state (in different guises at London and borough level) interacted with national government to create and operate regulatory frameworks and manage and deliver infrastructure services, mainly transport, primarily funded through grant mechanisms. While the privatisation of UK infrastructure ensued in the 1980s and 1990s, much of London's transport network, roads and flood defences remained in the public sector due to political opposition to privatisation of these assets and the role of national and local governments in providing critical infrastructure in the national capital (Helm 2013). Since 1999, the city-region-wide' governance of London has shaped the nature of infrastructure planning and investment with the Greater London Authority (including the Mayor) adopting a visible role in overseeing transport infrastructure provision (such as London Underground and buses through the co-ordinated role of Transport for London (TfL)) (Tomaney 2014). Until 2014, London was unique amongst global cities in not having a dedicated infrastructure investment plan. Following a recommendation from the London Finance Commission (LFC) (2013), a new infrastructure investment strategy – the London Infrastructure Investment Plan 2050 (GLA 2014) – is being prepared in order to identify and prioritise projects, and leverage in funding and financing for infrastructure provision in London. The Plan is designed to tackle the constraints of a fast growing global city in managing a rising population (London's population in January 2015 reached 8.615 million – the highest in its history – and set to grow to 10 million by 2030), economic growth (London constitutes 20% of total UK GDP) and environmental challenges, such as congestion, flood mitigation and energy sustainability. The consultancy firm, Arup (2014), has produced a cost assessment of London's long-term infrastructure needs, and identified a funding gap of £135bn between the level of resources currently available and what new investment is needed up to 2050. Multiple actors have become embroiled in the debate, often reframing London's infrastructure needs as a 'national' imperative given its economic weight and importance in the UK economy

(GLA 2014; London First 2010). It has been suggested that the funding gap could be bridged through greater fiscal decentralisation to London, and by a mix of taxation measures, such as business rate and council tax supplements, payroll tax, motoring tax and hotel tax, alongside user fares, property development and sponsorship (LFC 2013). Whilst most of these practices are state-led and sanctioned, they are bound-up within a growing process of financialisation, and are of a hybrid nature.

In addressing its broader infrastructure needs, governance actors in London, like other UK cities, have, however, had to confront some of the legacies of the privatisation of UK energy, communications and water industries in the 1980s and 1990s, which heralded a further detachment of local democratic accountability from the governance and operation of urban infrastructure (Martin 1999). Privatisation resulted in the creation of the Regulated Asset-Based Model (RAB) in which a regulator sets a framework for privatised investment that is 'balanced' out by user and consumer charges (Helm, 2013). Whilst it is envisaged that the private sector will continue to have a major role in future infrastructure financing in the UK, with 64% of planned investment in economic infrastructure between 2010 and 2020 expected to be wholly owned and financed by the private sector (House of Commons 2013). This headline figure disguises the active – and some would say growing – role of the state in the funding, financing, ownership, regulation and governance of national and local infrastructure provision in the UK (Helm 2013). And, in particular, the emergent mechanisms in which the state seeks to enable or leverage private sector investment to take place.

In a further illustration of an attempt to widen and deepen the market-led infrastructure investment model, the Labour government, in the late 1990s, argued that London Underground could itself not deliver long-term infrastructure improvements, and that a new PPP model was required to facilitate upgrades and maintenance of the underground system. Critics of the scheme at the time, such as the then Labour Mayor of London Ken Livingstone's Transport Commissioner, Bob Kiley, argued that the PPP was too complex. In a response to the consultation on the proposed PPP, TfL suggested that the draft contracts for the Partnership were "by

far the most complex contractural arrangements ever attempted to be applied to an urban mass transportation system" (TfL 2002: 2). The collapse of the Metronet PPP in 2010 due to severe financial problems has been well-documented (HoC 2013). Metronet – a consortia of Adtranz, WS Atkins, Balfour Beatty, Seeboard and Thames Water – was announced as the preferred bidder for the Bakerloo, Central and District London Underground lines and sub-surface lines (Hammersmith and City, Metropolitan and East London), but found itself in 2007 facing a major overspend and was unable to access loan facilities from its banks. Subsequently, Metronet went into administration in 2008, the PPP collapsed, and TfL (with UK government cash) bought out the underground lines from the private consortia in 2010. What began as a private and market-led solution to a critical infrastructure asset need ultimately ended up being bailed-out and salvaged by the state.

The argument here is that the geographies of infrastructure financialisation and governance are uneven, and that different places are engaged in various models of infrastructure funding and financing, with a number of approaches increasingly of a hybrid nature, which involves a continued role for the state but one that is to greater or lesser degrees financialised. In London, for example, the large-scale and complex transport infrastructure projects that are being constructed or are planned, such as Crossrail or the Northern Line Underground extension to Battersea, have required direct state investment or sovereign guarantees to underpin private capital financing of the projects. As the accountants PwC indicate, the cost of major infrastructure projects like Crossrail, currently the largest construction project in Europe costing an estimated £24bn, cannot be funded entirely by the private sector because of the scale and risks involved as well as the need for private finance capital to generate returns. This means that these kinds of projects require state financial backing (PwC 2014). Indeed, even in the midst of fiscal consolidation and austerity in the UK, HM Treasury has provided a standby refinancing facility worth £750m to enable TfL and the GLA to borrow up to £1bn towards the cost of constructing the Northern Line Underground extension (NAO 2015).

Reflecting the investment-led approach identified above (Table 7), there is also growing evidence of state funding for infrastructure, deployed through grants, being articulated, represented and distributed in the guise of financialised investment funds. This model sees investors provide resources in the form of Revolving Infrastructure Funds (RIF), whereby investment is made on a loan or equity basis, and repayment is made on the investment. Examples in London include the London Energy Efficiency Fund and the London Enterprise Panel's Growing Places Fund (GPF).

The London GPF forms parts of a national (England-wide) infrastructure and regeneration funding package that Local Enterprise Partnerships manage, and which is designed to provide debt or equity funding for local projects that have stalled due to credit difficulties, but which are able to demonstrate local economic impact and provide a return on investment.

As a global city prominent in the international urban hierarchy, stable political-economy and buoyant commercial and residential property markets, London is also an attractive proposition for investors that view infrastructure as an alternative asset class (London First 2013). The UK government is keen to attract pension and insurance fund investment, alongside Sovereign Wealth Fund financial backing, for infrastructure projects (HMT 2013; RIO 2014). Pooling resources in search of scale, London and Greater Manchester local authority pension schemes have created a joint pension fund of over £500m to invest in infrastructure projects in London and the Greater Manchester City Region. This follows a £10bn strategic partnership created by the London Pension Authority and the Lancashire County Pension Authority. The Mayor of London, Boris Johnson, has called for UK local authority pension schemes to amalgamate to streamline and create scale to match some of the largest pension funds in the world. There are nearly 2,500 pension funds in the

UK, but almost half are managing funds of less than £5 million, and only 190 pension funds have assets of over £1 billion (Delacroce *et al*. 2011).

Sovereign wealth funds have eyed real estate in London as a major opportunity to create and capture value from investment and generate high returns (WEF 2014). The Malaysian government, for example, through its Sovereign Wealth Fund is a major investor in the Northern Line London Underground extension project in Battersea, focusing primarily around real estate development. Here, a UK government infrastructure guarantee forms part of the financial package. The new River Thames Tideway Tunnel in London, which will cost £4.2bn, is being partly designed, constructed and financed by a new regulated utility company, Thames Tideway Tunnel Ltd, which is seeking up-front private capital investment from pension funds and sovereign wealth funds. The project will be funded entirely through consumer charges, but the financing will be underpinned by a UK government support package to help mitigate construction risk (GLA 2014). Other hybrid financialised initiatives and institutions include the emergence of TfL as a property developer to fund £1bn of transport improvements (Allen 2015). TfL is one of London's biggest landowners and the organisation is looking to work with up to six private sector companies to help redevelop more than 500 sites, and eventually for the capture of the uplift in value of these regenerated sites to produce sufficient revenue to reinvest in transport infrastructure.

The National Audit Office (NAO 2015) – a national public sector spending and accountancy watchdog – has been critical of some UK state engagement in infrastructure financing, such as the operation of the guarantee scheme for infrastructure projects. The scheme, introduced in 2012, is designed to encourage lending to projects, which have faced credit problems since the global financial crisis and economic downturn. The scheme has been used to support £1.7bn investment in seven projects across the UK to date, and provides a sovereign-backed guarantee to help projects access private capital. Leveraging its credit rating, scale and

financial credibility, the UK Treasury issues an unconditional and irrecoverable guarantee to lenders that scheduled interest and principle payments will be paid in full, irrespective of performance. This transfers project and financing risk to government and taxpayers in return for a fee. The NAO has questioned whether sufficient value for money exists from the lending scheme compared to direct government lending, especially in a context of historically low interest rates for the UK government borrowing. The NAO (2015) notes that, as a result of the scheme, there is stronger protection for private financial lenders than any other comparable scheme in Europe.

4.2 UK Cities

Historically, the funding, financing and operation of municipal infrastructure in the UK was led by local authorities directly. This process started to be rolled-back following nationalisation and standardisation between 1930s and 1960s, and was further eroded by infrastructure privatisation in the 1980s (Whitfield 2010). Since the global financial crisis, and the desire to invest in local infrastructure to drive economic recovery and resilience, UK local authorities have sought and been encouraged to strengthen their involvement in the planning, funding and financing of infrastructure. There remains a limited place for local authorities, though, in the implementation of the UK National Infrastructure Plan (RSA 2014).

Typically, UK local authority investment in capital projects is financed through grants and self-financing prudential borrowing from the Public Works Loans Board (PWLB). Faced with a reduction in central government grants, a tight squeeze on their revenue streams as part of national fiscal consolidation and a highly centralised system controlling their ability to tax and spend, but coupled with an increase in the cost of PWLB loans, local authorities in England and Wales have been considering turning to the bond markets for infrastructure finance. Aside from the bonds that were issued by TfL to help finance the London Crossrail project, few UK local

authorities have ventured into the bond markets recently. Bond issuance requires an entity to possess a credit rating, which can cost anything up to £50,000 to acquire, and demands expertise in packaging up a bond at a scale, risk and maturity profile attractive to investors. Drawing upon the experience of Sweden, the Local Government Associations of England and Wales have undertaken feasibility work to develop a new Municipal Bond Agency in response to the increased cost of PWLB borrowing, and to co-ordinate, pool and support smaller local authority financial engagement and interaction with international capital markets (LGA 2012).

Adopting a market and increasingly investment-led approach, local authorities in the UK have been compelled over the last two decades by national governments to embrace PPPs and PFIs to finance infrastructure investment, particularly in softer social infrastructure assets and systems, such as schools, social and leisure services. The move towards PPPs and PFIs, which Harvey (1989) positions at the centre of urban entrepreneurialism, represented an attempt to keep capital spending off the national government's balance sheet, but proved controversial because of criticism levelled at the inefficiencies in public service delivery and the increasing liabilities incurred by public sector institutions (Pollock 2005; Shaoul 2007). Continued concerns, particularly in relation to value for money, payments to the private sector and the level of indebtedness within the public sector, led the UK coalition government to review PFI and PPPs, when it came into office in 2010, and resulted in the creation of a 'new' PF2 scheme in 2013 (HMT 2012). In a reflection of the devolved nature of UK territorial public policy, the Scottish government has been pursuing a 'non-profit distributing' variant of PFI in Scotland (SFT 2015), separate to new arrangements developed by the UK government.

Since 2010, the development of 'City Deals' in the UK, with a specific focus on innovative infrastructure funding and financing mechanisms, couched within broader regional and urban governance reforms, represents an illustration of the hybrid nature of financialised infrastructure investment. Twenty-nine City Deals to date have been negotiated between local authorities and UK government, including one specific deal involving Glasgow city region, the Scottish government and UK government. City Deals comprise the largest cities (with the exception of London) in England preparing strategies for supporting growth and job creation (using public/private investment), and identifying the practical measures that national government could undertake to support delivery of the plans. Early analysis suggests that cities and city regions are being compelled into finding and attracting new sources of private and even international capital, developing innovative business models for infrastructure provision and establishing new institutional and governance

arrangements (O'Brien and Pike 2015). It is important to situate efforts to devise new funding and financing practices and mechanisms for local infrastructure within the context of a highly centralised state, such as the UK, and the current phase of austerity in response to budget deficits and public indebtedness. To what extent cities and local authorities have been encouraged to be innovative and adopt riskier approaches, when drawing up practices and mechanisms, is debatable. The development of Tax Increment Financing (TIF) projects in three City Deals (Newcastle, Sheffield and Nottingham), coupled with TIF-type arrangements in twenty four Enterprise Zones across England, is predicted on local authorities engaging in a process of securitisation by investing in up-front infrastructure (often through borrowing) to unlock development that would in turn generate business rate tax income – a proportion of which would be retained by local authority sponsors of the schemes to repay the initial borrowing. This variant of TIF is smaller and less comprehensive mechanism than TIF models in the United States, and is tightly controlled financially by the UK government.

Other financialised models, such as RIFs, are a further feature of the City Deals landscape in the UK and the broader local growth agenda in England. The Greater Manchester City Region managed to agree as part of its City Deal after lengthy negotiations stretching over 18 months an Earn-back 'invest to earn' mechanism with the UK Treasury. Greater Manchester would invest in infrastructure – mostly transport – and evaluate the impact of investments on economic growth in the city region with a view to assessing what uplift in growth (if any) had accrued above and beyond a baseline. The economic growth would be measured in terms of additional tax take and Greater Manchester would receive a proportion of the tax increase to cover the cost of the initial investments and to use to further invest in new infrastructure. Critically, this mechanism represented an attempt to shift the incentive structure for the local authorities from focusing on increasing the potential business rate tax base by encouraging investment and provision of commercial property, irrespective of likely demand, towards growing economic output and employment.

Reaching out beyond national government grants toward wider sources of finance internationally has been an emergent practice across UK cities. Attracting greater pension and insurance fund financing of infrastructure, whilst not a direct component of the City Deals, has been an emergent strategic priority for UK local authorities facing significant reductions in direct public sector funding. In Greater Manchester, the local authority pension scheme has made a significant investment in housing development in Manchester, whilst other local pension schemes in the country are considering making investments in transport projects that offer stable, long-term returns. Sovereign Wealth Fund money (in particular Chinese and Emirati) has also been coveted by local government, with Birmingham City Council publishing a Sovereign Wealth Fund prospectus, and Manchester City Council announcing a £1bn deal with Abu Dhabi United Group to build 6,000 new homes in East Manchester (Manchester City Council 2014). In 2013, two UK government agencies – UK Trade and Investment within BIS and Infrastructure UK within HM Treasury – announced the establishment of the Regeneration Investment Organisation specifically to identify and attract foreign direct investment into UK infrastructure and regeneration (RIO 2014).

4.3 United States

Road and water infrastructure in the United States has long been supplied by federal, state and local governments because of their unique abilities to raise capital in a decentralised federal governance system. The majority of publicly owned infrastructure in the US is funded by tax revenues, meaning that the state and public sector continues to play an integral and active role in the planning, funding, financing and operation of infrastructure. Like most urban areas across the world, many US cities are looking to upgrade or maintain infrastructure to boost growth and development (Manyika *et al*. 2012). In the wake of the global financial crisis, Great Recession and search for economic recovery, in 2013 President Obama's federal

budget proposed a plan to renew and expand America's infrastructure using a $50 billion up-front investment connected to a $476 billion six-year surface transportation programme and the creation of a National Infrastructure Bank (US government 2013). 'Build America Bonds' (BABs) were also introduced for a period of two years following the global financial crisis in order to attract additional private capital for infrastructure projects, and to stimulate economic recovery. The bonds were used to invest over $180 billion in new public infrastructure, such as bridges and transport systems, across cities in the US states. US Treasury statistics revealed that nearly half of all funding for BABs issuances (47%) were for projects in the 100 largest metropolitan areas. Eight percent were in metros outside of the 100 largest cities and city regions, and 5% were outside 'metropolitan America'. The states issued the remaining 40%, and those states with the largest economies had the largest dollar amount of issuances, with half going to projects in California, Illinois, New York, and Texas (Puentes *et al.* 2013).

For two hundred years, state and federal governments in the United States have issued bonds to finance infrastructure (US Treasury 2014), a process which itself extended the power and reach of financial markets into the urban environment as governments issued and purchased large amounts of debt. Although municipal debt stands at $3.7tn (SEC 2012), municipal bond issuance to finance new projects has declined since 2005. Fiscal crisis, growing indebtedness and self-imposed debt caps have restricted the ability of states and local government to issue new bonds, whilst there has also been some discussion as to whether the Obama Administration wants to change or reduce the system of tax-exemptions on bonds.

The hiatus has meant that federal government investment in national infrastructure has declined, whilst states and local government, some of which have faced acute fiscal crisis and austerity (Peck 2014), have sought to identify and introduce new funding and financing mechanisms to generate additional revenues that could either supplement or replace declining federal resources (Brasuell 2015). In some cases,

state governments have taken the step of seeking and securing electoral mandates to use business and commercial taxes to fund infrastructure investment. Texas, for example, plans to use oil and gas production taxes in the state to raise $1.7bn towards transport infrastructure (The Economist 2014). The search for new mechanisms and practices amongst states and local governments forms a contribution towards the increased financialisation of urban infrastructure in the US as local and state governments seek to leverage in private capital by monetising existing infrastructure assets and their valuable future revenue streams (Farmer 2014). Infrastructure financialisation is a relatively recent phenomenon in US cities – although Chicago has been a pioneer of initiatives such as TIF (Farmer 2014; Strickland 2014; Ward 2012) – but its effects, which are highly uneven, have reshaped urban spaces and institutional arrangements in metropolitan areas (Weber 2010; Katz and Bradley 2013) and have prioritised infrastructure investors (Farmer 2014), to such an extent that they have a direct influence on city governance and are able to detach urban infrastructure from its local context (Torrance 2008). The risks, costs and unintended consequences for cities and local governments engaging in financialised activity are beginning to be understood (Schäfer and Streeck 2013). There is a growing disconnection between the historic low cost financing – around 3% interest rates for 20 year money – and investment in US infrastructure, which currently stands at its lowest level since 1950. But other countries face a similar issue, and it represents in the main a political choice. The problem of ‘grid-lock’ in Washington DC, with a Democratic President and Republican-majority Senate and Congress at odds with each other is fuelling a situation whereby national politicians are increasingly reluctant to agree to raise new revenues (including increasing taxes) to back infrastructure bonds. For example, the Federal Gas Tax, which funds the US Federal Highway Trust Fund (i.e. the inter-state road network), was last raised in 1993. Amidst this impasse, in 2014 Obama issued a memorandum on expanding public-private collaboration on infrastructure development and financing, and tasked an expert group to present new proposals on how the private sector could increase its financial contribution to investing in US infrastructure (US Treasury 2014).

In terms of private infrastructure investment and provision, over 75% of US households rely on privately owned electricity supplies whose rates are regulated by public utility commissions. Telecommunications networks are owned by the private sector, which also owns oil, natural gas and railroad freight. Obama has called on local government to take a greater lead on providing high-speed broadband provision to create more competition for privatised monopolies (Hirschfield-Davis 2015). In the aftermath of Obama's intervention, Google announced plans to work with US cities and city regions to expand super-fast broadband and has encouraged local authorities to work with the global giant to provide access to the local physical telecommunications infrastructure needed to support high-speed broadband services.

At the same time as encouraging local state involvement in communications infrastructure, the Obama government has also sought to increase private or market-led involvement in infrastructure financing and operation, based on emergent national interest in PPPs, which to date has been a relatively small part of US infrastructure investment (Sabol and Puentes 2014). PPPs have played a limited role at the local level in the US because they bear higher financing costs than municipal bond financing. Recent examples of PPP arrangements, such as the leasing of Chicago's parking meters, have also been heavily criticised for the liabilities incurred by the city administration and the influence that investors had over spatial planning and urban development strategies (Farmer 2014). Although the majority of infrastructure in the US is financed on balance sheet through government taxes – in tune with the financialised shift toward more investment-led approaches, and mindful of the party political impasse in Washington D.C. – the US Government is keen to see more infrastructure investments at the local level operate on a project finance basis in order to attract private finance and management, and in an attempt to limit tax-payer risk and indebtedness. The US government claims that access to low cost, tax-exempt bond financing for projects exclusively owned and operated by state and

local governments has discouraged state and local governments from seeking private equity financing (US Treasury 2014). In addition, the decline of bond insurance markets because of high cost and risk factors stemming from the financial and banking crisis in 2007/08 has led senior debt lenders to be more cautious about investing in local infrastructure.

Given their relative autonomy in the decentralised federal system and traditions in circumscribing the bounds of the market, some US states do not permit PPPs currently because state legislation and tax law does not allow bonds to be issued for the purposes of financing infrastructure owned by private interests. The US government believes that one of the most significant obstacles to developing and expanding the PPP market in the United States is the different decentralised legal and regulatory frameworks that exist across the country. This begs the question of how the federal government could or should intervene to encourage greater PPP regulatory uniformity and take-up across the different states. Partly in response, the government, in January 2015, announced proposals to bring together bond finance and PPPs, and enable greater private engagement in infrastructure financing. Qualified Public Infrastructure Bonds (QPIB) would be the first type of municipal bonds available for PPPs and would not be subject to tax. They would have no expiry date and no limits on the total amount issued.

Against the background of a yawning investment gap for infrastructure development and renewal, the US is looking to introduce mechanisms that encourage private sector finance and urban infrastructure investment, planning and operation alongside existing and long-standing financialised practices, such as TIF. TIF is used by municipalities in forty nine states and has funded everything from major entertainment centres to industrial expansions to public housing redevelopment (Weber 2010), and is the most widely-used programme in the country for financing local economic development (Briffault 2010). TIF has been controversial, however, with evidence suggesting that engaging in financialisation, through mechanisms

such as TIF, can produce damaging impacts on cities, particularly those in peripheral and underperforming areas with less buoyant and dynamic property markets (Byrne 2005; Strickland 2011; 2014). The “intensification” of financialisation (Lee *et al*. 2009: 727) is contributing towards the pattern and process of uneven economic development. Despite the concerns, states such as Minnesota are actively considering introducing financialised value capture mechanisms, such as land value taxation, to fund road transportation infrastructure.

4.4 Australia

Australia has a highly urbanised environment, with the vast majority of the country’s population, which is rising, living in five coastal cities (Department of Infrastructure and Transport 2013). Local and urban infrastructure, such as ports, airports and other transport systems, matters enormously to Australia given the density and location of its metropolitan environments (Office of the National Infrastructure Coordinator 2013). However, like the UK and US, the demand for national and local infrastructure investment in Australia is outstripping the existing levels of ‘available’ public and private resources.

Local government is not afforded a formal role under the Australian constitution. Instead, the federal government, states and territories have separated powers, with the states and territories providing the legislative and regulatory framework (and funding, some of which is pass-ported from the national government) for local government in each state, which creates an uneven pattern of local authority roles, functions, powers and responsibilities, which in turn defines and shapes distinct local and urban interaction and engagement with infrastructure provision. The states also play a leading role in the spatial planning and investment strategies of cities and major metropolitan areas.

Whilst federal, state and local governments share a degree of responsibility for publicly-owned infrastructure (Grimsey *et al*. 2012), major infrastructure assets, such

as energy, have been funded traditionally by state governments, whilst the federal government, like its US equivalent, funds the national inter-state road network. A large number of assets and systems are still owned and operated by the public sector, despite a major process of privatisation unfolding since the 1980s (Haughton and McManus 2012), and individual states retain a key role in the operation and function of critical infrastructure. Some states, such as Queensland, have established their own dedicated 'sovereign wealth fund' bodies (e.g. the Queensland Investment Corporation) to manage state investments, which have been used to finance infrastructure projects at home and abroad. Local government is responsible, in the main, for the maintenance of the local roads and bridges network. Infrastructure bonds were introduced in Australia in the 1990s but failed to gain traction because of tax concerns and perceived fiscal implications for the federal government. However, they have begun to re-emerge as a possible financing model because of the rising demand for new investment in urban infrastructure build and maintenance. At the same time, there has been reluctance on the part of the main political parties in Australia to sanction direct long-term public borrowing by governments at all spatial levels for capital expenditure (Grimsey *et al*. 2012); a position consolidated recently by the Liberal coalition government as it seeks to implement fiscal consolidation measures in an attempt to reduce the federal budget deficit, and move the country towards budget surplus (Australian Government 2014). This has led to criticism that Australian cities have either placed or been compelled into placing short-term financial considerations ahead of longer-term direct investment in infrastructure that could deliver sustainable economic outcomes (Committee for Melbourne 2012).

Local government in Australia, which is responsible for infrastructure assets worth AUS$301bn (Grimsey *et al*. 2012), has been looking to introduce value capture mechanisms for funding future infrastructure provision. Unlike UK cities, cities in Australia have a wide range of property and other taxes that they can levy directly to raise revenue (Grimsey *et al*. 2012). For example, Melbourne and Sydney both

operate a workplace parking levy in the central business district, which is a fee-based mechanism that issues charges for the use of parking bays in a defined zone or zones. Typically, the revenue from the levy is used as a funding source for public transport investment (Committee for Melbourne 2012). Other initiatives include local authorities in states, such as New South Wales, forming formal region or city region coalitions in and around the Sydney metropolitan area in order to create a larger pool of assets and thus increase the potential borrowing power of local government (Grimsey *et al*. 2012). Policy transfers, such as quasi-privatisation, in the form of PPPs, have incurred a rapid expansion over the last twenty five years, with Melbourne and Sydney being at the forefront of introducing market-led models and regulatory regimes that enabled infrastructure projects to get off the ground but at the same time remain 'off balance sheet' (Haughton and McManus 2012). As with the London Underground Metronet PPP, however, there have been high profile casualties of the PPP mechanism in Australia. Haughton and McManus (2012), for example, provide a detailed account of the background, operation and ultimate collapse of the Sydney Cross City Tunnel PPP, and the cross-boundary, international institutional investment linkages the project enveloped and eventually snared, stretching right across the globe to reach the now nationalised (i.e. UK government-owned) Royal Bank of Scotland.

Like their UK and US counterparts, national, sub-national and local governments in Australia currently face financial and public service delivery pressures. The federal government has set a target of achieving a federal budget surplus of 1% by 2024, and a large percentage of the resulting 'austerity' that is thought needed to achieve the goal of surplus will be derived from the billions of dollars in reductions in public expenditure announced in the May 2014 federal budget. This includes reductions in the local government Federal Assistance Grants programme where grants will be frozen up to 2018, as part of a package of spending reductions totalling AUS$36bn over four years (Smith 2014). These grants help local government maintain local infrastructure and services, including roads and bridges (ALGA 2014). Federal

government funding will, however, continue to be provided through the Roads to Recovery Programme and a new renewal programme for bridges, some of which will be funded by receipts that federal and state governments hope will be generated by a new Infrastructure Asset Recycling scheme.

The 2014 federal budget saw the announcement of an AUS$11.6bn Infrastructure Growth Package, which the Australian government says will cost AUS$5bn over five years and will lever in an additional AUS $125bn of private infrastructure investment. The scheme includes incentives to encourage asset recycling to generate receipts that can be used to fund new infrastructure. The asset recycling scheme will see individual states and territories sell or lease assets and receive a percentage of the sale price from the federal government to reinvest in infrastructure. Proponents of the programme, such as the Office of the Infrastructure Coordinator, support the transfer of assets to the private sector (2013), whilst the Australian Infrastructure Reform Working Group has also called for states to monetise existing assets and implement privatisation reforms in return for increased national government investment (IRWG, 2012). The benefits of such an approach are said to include: productivity gains, private sector discipline, and the financing of infrastructure and assets off government balance sheets, which it is said to be a favourite mechanism of the international credit rating agencies. This initiative forms part of broader objective of federal, state and local governments to identify new financialised mechanisms and practices to help build or maintain infrastructure without adding to overall public debt and thus risking damage to existing credit ratings (Haughton and McManus 2012). Critics suggest that the asset recycling scheme may lead to the further splintering or unbundling of infrastructure in the urban context (O'Neill 2014). Other concerns centre on whether the public sector under-values and under-charges for infrastructure by underestimating how private investors package and plan for future revenues (O'Neill 2013), and that the complex financialised that will undoubtedly emerge will be difficult to scrutinise. The expectation is that assets will be bundled-up to be sold or transferred to potential pension or insurance funds,

Sovereign Wealth Funds or private investment companies, which have long been attracted by guaranteed long-term stable revenue streams (O'Neill 2009).

In a reflection of the uneven geography to asset recycling, and a sign of the political challenges to the scheme, State elections in Queensland in February 2015 saw the electorate reject the incumbent Liberal government, which had proposed to privatise the state's electricity infrastructure. With other state elections in the offing, such as New South Wales, in March 2015, where the current state government is proposing to sell the state electricity networks, as part of the asset recycling scheme, privatisation in one of the birthplaces of financialised infrastructure provision remains a contentious issue.

The 'Macquarie Infrastructure Model', based on the creation of specialist infrastructure funds under management, has its origins in Australia in the mid-1990s, following changes in pension law alongside government privatisation of infrastructure assets and networks. O'Neill (2008) explains how Macquarie led the mobilisation and securitisation of earnings from public utilities in Australia, UK and Canada, and that the bank's approach to risk explains its success in creating, selling and managing financialised infrastructure assets. In an attempt to maximise fee income, Macquarie has continually shifted into new infrastructure products and new geographical markets to derive benefits from the localised nature of infrastructure markets, and to overcome the limited opportunities in Australia for an international financial institution seeking to expand its infrastructure investment. Whilst a number of global infrastructure investment funds have emerged as rivals, few financial institutions are said to have been successful as Macquarie and their bespoke approach to tailoring funding and financing needs to local contexts (O'Neill 2009).

There has been recent attention in Australia in the UK City Deals approach (Property Council of Australia, 2013), with the accountancy firm KPMG, which has advised some UK cities and city regions, demonstrating publicly the components of the City

Deal model to Australian stakeholders (Atter 2013), and the opposition Labor Party showing some interest. The question is how these one-off, ad-hoc arrangements, which the City Deals are based upon, would fit within a formal federal governance system? It may be that the relatively informal role of local government in Australia, which has a power of general competence, similar to local government in England, lends itself to more transactional, business-type relationships between tiers of government and the private sector. In a sign of the geographical reach of financialisation, the interest in the UK City Deals model has accompanied calls for the federal government to shift away from grant funding of infrastructure and move towards an incentivised, investment-led model that seeks economic and financial returns on investment. But again these developments do not imply a simple linear and one-way transition toward financialised models: the process is hybridised, negotiated and implemented in particular contexts with the state at different scales playing pivotal roles.

The uneven geography of infrastructure financialisation and governance, with its different funding and financing practices and mechanisms illustrates the evolving and complex nature of how national, sub-national and local states, and private capital, interact with each other to identify, generate and leverage in infrastructure investment. There is not a binary fundamental transition between state and market-led funding and financing mechanisms, but instead actors in different nations and cities are adopting arrangements they believe best suit their circumstances, and which some are hybrid (state, market and financialised) in nature. There is also evidence of different places either learning from or being willing to engage in policy and practice translation, sometimes without sufficient recourse to context or appreciation of local geography. This means that the application of infrastructure financialisation and governance, in specific local environments, may not succeed or endure beyond the short-term.

5. Conclusions

This working paper has attempted to make a further contribution to the growing conceptual and policy interest in the financialisation of urban infrastructure assets, systems and networks. The two key arguments have been, first, that financialisation is an uneven, negotiated and messy process unfolding in differentiated ways in different geographical contexts; and second, the role of the state at different scales has been reinforced rather than reduced in the context of the financialisation of infrastructure because of its particular form and nature. This series of points are derived from existing and emergent analysis and evidence that there has long been a relationship between the state, in its different guises and at different scales, and the private sector, through the different stages of the infrastructure life-cycle, which has both widened and deepened as a consequence of the recent emergence of infrastructure as a new alternative investment class.

Whilst the state retains a key role, national, sub-national and local governments are nevertheless looking to lever in additional private sector capital, using different mechanisms and practices, some of which are increasingly financialised and hybrid in nature. The process of increased financialisation, which gained traction in the run up to the global financial crisis, and has retained influence through the Great Recession and beyond, now pervades everyday life, and has given rise to infrastructure being viewed as an alternative asset class. This model has gained further currency amongst governments that are struggling to deal with fiscal stress in the guise of state indebtedness and budget deficits. As a model, financialised infrastructure assets do not alone answer the fundamental questions of where and how infrastructure is funded, as opposed to where and how it is financed. Amidst an apparent wealth or wall of international and global capital waiting to invest in infrastructure assets and systems, how the state and/or consumers ultimately are prepared to pay – either through taxation or user fees – for infrastructure is often hidden or is given limited attention, in the main because of political considerations

and concerns about raising taxes, reducing public expenditure or increasing government debt.

As infrastructure becomes funded and financed in increasingly financialised ways, different practices, tools, instruments and governance arrangements are either being modified or constructed in order to provide funding and finance. Geography remains an integral feature of the complex processes of infrastructure financialisation and governance. National and local state and intermediary actors in capital markets are determining, shaping and reshaping how financialisation takes place on the ground. The illustrative examples of London, UK cities, United States and Australia demonstrate how national, sub-national and local governments are seemingly prepared to adopt and utilise different mechanisms and practices, some state or market-led, but others hybrid, complex and at times ad-hoc. This supports the analysis that context matters in relation to questions of local and regional development, and that off the shelf policy transfers can be problematic and may be unable to deliver the desired outcomes that policy-makers intend.

It is useful, in conclusion, to outline some future research challenges in this area, and to call for further empirical investigations into the financialisation and governance of urban infrastructure, which should help to strengthen understanding of how local environments and institutional ensembles are shaped and re-shaped by public and private infrastructure funding and financing mechanisms and practices. In particular, there are two issues worth highlighting. First, it would be useful if scholars could undertake or encourage more studies that explored the continued tension that exists between co-ordination and integration versus fragmentation and splintering of urban infrastructure funding, financing and governance. And second, the generation of additional data and subsequent analysis, drawing upon both extensive and intensive research methods, would support and inform both existing and emergent conceptual frameworks that are seeking to interpret the increasing interplay between

the process of deepening financialisation and the continued role for the state in constructing, developing and re-making local and urban landscapes.

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