PUBLIC-PRIVATE PARTNERSHIPS (PPP) ON MOULDING STATE STRUCTURES: THE NON-ERGODIC AFRICA

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Abstract

Public-Private Partnerships (PPP) is a ubiquitous reality. In Africa, the wave of PPP has hit states in their infancy – still moulding following only 50 years since independence. The common perspective of PPP on the realms of scholarship is transactional (focused on the delivery-end of infrastructure). This paper presents a deeper and broader perspective, and it is a distillate of a case study on PPP as a policy phenomenon. It dissects and illuminates the interaction between the forces of state formation and the wave of PPP hitting the continent. The lens of this case study is Institutional Rational Choice (IRC). The tools are a variety, comprising textual analysis, hermeneutics and econometrics – in keeping with the essence of case study (explication of reality in-situ). The product is not the orthodox generalization (claiming 'the way'). Instead, the explication offers a viewpoint (and trigger questions) on public space of Africa, while underpinning the non-ergodic character of that space.

Keywords: Partnerships, the Non-Ergodic Africa, Moulding State Structures
JEL: H1-7, G2 & R5

1. INTRODUCTION

The present wave of Public-Private Partnerships (PPP) is hitting the young states of Africa. Typically, the countries of Africa attained independence just over 50 years ago. Following independence, the countries were embroiled in military conflicts as the nationalist forces of independence fizzled out. Moreover, the socialist charters that typified the aftermath of independence were strained by the military conflicts, and obliterated by Structural Adjustment Programme (SAP) starting the early eighties. Therefore, the state structures of Africa are still nascent – they are moulding.

So, what will be the outcome of the interaction of the two dynamical sets (PPP and state moulding)? That question cannot be addressed using the orthodox Hypothetico-Deductive (H-D) framework. Hypotheses may be attempted but there is no precedent (read, data) for testing the hypotheses and making deductions. On the other hand, scholarship cannot shy away from this question. It is a question that should grip long-term investors and policymakers. The way forward is case study [in an exacting usage]. The case approach dissects reality in-situ, exposing the instant mechanics without pretending a generalisation. In other words, the case approach embraces the phrase that anchors the Hippocratic Oath – 'we don't know'. Still, the case approach exposes the current drivers and mechanics of reality, so decision-makers are informed about the present state-space.

Further, this paper assumes Institutional Rational Choice (IRC). That is, policy decisions succumb to institutional influences (i.e. norms and values of society). On that premise, policy decisions are inherently irrational. Therefore, state-space averages are not constant. It is a non-ergodic world. On that basis, the future calls for continual management. Knowledge of the instant state-space should guide on the starting toolkit.

2. LITERATURE REVIEW

2.1. Challenging Orthodoxy

Literature is traditionally presented as a concentrated piece (section of a paper). That approach suits the H-D orthodoxy of most journals. Literature defines the source of the hypothesis, which is on a specific subject. Case study is different. It dissects [complex, interwoven] reality in-situ. Therefore, the pertinent literature must flow with the dissection of the case capsule (cf. Flyvbjerg 2006).

Moreover, the interdisciplinary demand of case study brings to light two imperatives of any epistemic effort in social science – the vantage point and lens. On the former, in an attempt to emulate physical science, social science has tended to hide the vantage point (*Ibid.*). That way, social science appears context-free [like physical science]. However, how many of the leading social scientists would think the same way had they not attended a particular school? Point made.

As regards the lens, the assumption inherent allows room for the complexity of the case. In this paper, for instance, IRC is used. While the paper introduces IRC, it does not have the space to attempt justification of its usage. Therefore, IRC stands as a fixture (premise).

Subsequently, the two fixtures (vantage point and lens) are a priori determinants that can be presented infused with literature the H-D way (i.e. concentrated in a section). However, the two are also elemental to the case methodology, and therefore they are presented in the section so named. Consequently, the remainder of this Section 2 considers the main terminologies of the case (PPP and state formation), and the framework used to define them (CSF, below).

2.2. Construction-Structure-Function (CSF)

The CSF framework is an axiomatic synthesis [of reality] that this paper uses to dissect the terminology 'public-private partnerships (PPP)'.

Definitions should be delimiting. The CSF framework draws on the fact that every bit of reality or concept is a constitution of elements. Therefore, the describing words (attendant terminologies) should capture the structure of the reality. Moreover, structure cannot exist without a process leading to the existence of the structure. That process is called 'construction' in this paper. Finally, the structure must have a reason for existing. It must have a function.

2.3. Public-Private Partnerships (PPP)

It is a cooperative arrangement between the public and private sectors that aims to mutually manage project risks and share ensuing rewards. Consequently, PPP allocates risk to the party better positioned to manage the risk. Furthermore, risks that appeal to PPP are associated with long-term projects, hence PPP is often long-term.

The construction process of PPP (policy formulation and organisational formation) comprises a variety of paths. Government portals are awash with these empirics (for example: HM Treasury (UK) 2000). Moreover, scholarship on service delivery using PPP is vast (Osborne and Murray 2000 is a good start). This research does not discuss delivery paths, neither does the research examine different approaches to PPP policy-making (for such exposition, see Hodge and Greve 2007, Ghobadian and Others 2004, and Grimsey and Lewis 2004).

The second strand of the definition [of PPP] is structure – the mechanics following policy enactment. To this end, the research identifies the need for public stake (shareholding) in the Special Purpose Vehicle (SPV) as a pivotal cord in the mechanics of PPP. However, practice has not appreciated this cord as UK experience shows (HM Treasury 2012). The rationale for the public sector stake [in the SPV] is straightforward: PPP must be a welding of the public and private sectors. The challenges that accrue from the butting of the two should be managed – but practice seems to escape from these challenges by allowing wholly private shareholding of SPV (thereby losing the value of public-private ownership).

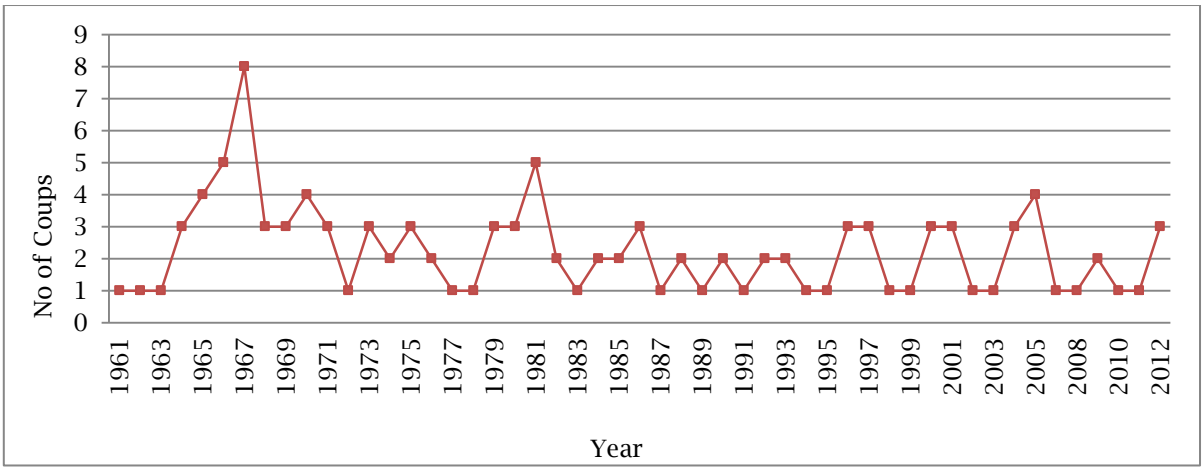
The third strand in the definition of PPP is function. What role does PPP perform? When is it employed? The definition identifies public service as the object of PPP. To that end, PPP has been employed outside the salient delivery of physical and social infrastructure. A unique example comes from the US Treasury Department (see De Palma et al. 2009 and Bebchuk 2009).

2.4. State Formation in Africa

When colonial powers entered Africa in the nineteenth century, the continent was a collage of institutions (i.e. numerous pockets of ethnic groups, representing different values, norms and practices). The lines of division of the scrambling colonial powers paid no respect to that collage. Mazrui (1978) is a decent point of initiation on this history.

When the countries attained independence in the fifties and sixties, the emerging native nationalists at the helm of power soon had to confront tensions resulting from the many of institutions within their countries. These institutional tensions and the tectonic forces of the Cold War led to coup d'états across the continent. See Rothchild (1995), Allen (1995), and Fearon and Laitin (2003), for the history, and Figure 1 for statistics on the coups.

Figure 1. Military Coups in Africa



Source: African Development Bank, Barka and Ncube 2012

In the eighties SAP emerged. The nascent public institutions and the spouting organisations (cf. North 1990) were starved of funding in favour of private sector actors. Under the minimalist state ethos of SAP, subsidies to public entities had to end and be replaced by corporate entities operating at arm's length from policymakers. This change was most evident in the infrastructure sector, under the commercialisation and corporatisation drive (see Amonya and Okello 2014).

Today, the wave of PPP hitting the continent desires the corporate entities of SAP as public sector partners – kindred entities for business. However, Amonya and Okello (2014) present a case of Uganda showing that the SAP drive withered off public sector entities without creating new business-like entities.

However, the mechanics of PPP on the continent is deeper. The reform of public sector organisations is merely the front of a deep moulding of the state that traces back independence. The remainder of this paper seeks to expose that deep mechanics.

3. METHODOLOGY

3.1. Case Study

Our world is guided by physical reality. That is what our senses capture daily. However, the social sphere is also a reality - except, it eludes our senses. However, being accustomed to the deterministic physical world, we are tempted to search for the same determinism [of the physical world] in the social world. Scholarship has not escaped that trap. The dominance of the hypothetico-deductive approach in social science (and particularly economics) traces to that trap (see Flyvbjerg 2011).

The rescue of social research is case study. It allows capsules of reality to be dissected and illuminated without the imperative of generalisation (the crystallisation of the H-D approach). With the capsule opened, subsequent works may attempt intrinsic generalisation (deductions within the context of the case, see Johansson 2003). However, the greater benefit lies in the questions triggered by the illuminated capsule. Those questions will provide a tool for addressing future state-spaces of the evolving social reality. That opportunity of case study underpins this paper.

In addition, complexity requires a variety of tools. Moreover, the tools must not be determined a priori. They must be picked as the case progresses. The paper employs textual analysis and hermeneutics as well as statistical mechanics to navigate the case.

3.2. Institutional Rational Choice

To dissect reality, the worker must wear a lens (albeit, the lens is often implicit in scholarly works). This paper uses Institutional Rational Choice (IRC). This lens is credited [mainly] to Ostrom (1977 and 1991) and North (1992). The lens holds that decision-making is not entirely rational. It argues that individuals are limited by their cognitive capacity (Herbert Simon 1957), but more significantly, the decisions are controlled by the norms, values and practices of the society.

The IRC frame appeals to scholarship on Africa. The continent comprises nascent post-colonial states underpinned by senescence of institutions – some of the oldest in the world (Stein 1994 offers a good rendering on this subject). Therefore, the institutions of Africa are expected to reflect more strongly on the public platform in comparison with the more mature states of the West (for example).

4. EMPIRICS AND ANALYTICS

4.1. The Wave of PPP

Public-Private Partnership is an emerging frontier of policy knowledge. It is innovation. The diffusion of innovation has widely been modelled using the logistic function (for examples, Mahajan and Robert 1985).

Figure 2 plots investment in PPP in the UK and developing world using data from UK Treasury and Public-Private Infrastructure Advisory Facility (PPIAF) respectively. Further, against these plots are three logistic curves. They all represent the model in Equation 4.1.

$$I_t = K \,/\, (1 + Ae\text{^}(-rt)) \qquad (4.1)$$

Where:
$A = (K - I_0) \,/\, I_0$
I_t is annual investment in PPP
K country's PPP capacity
r rate of investment growth.

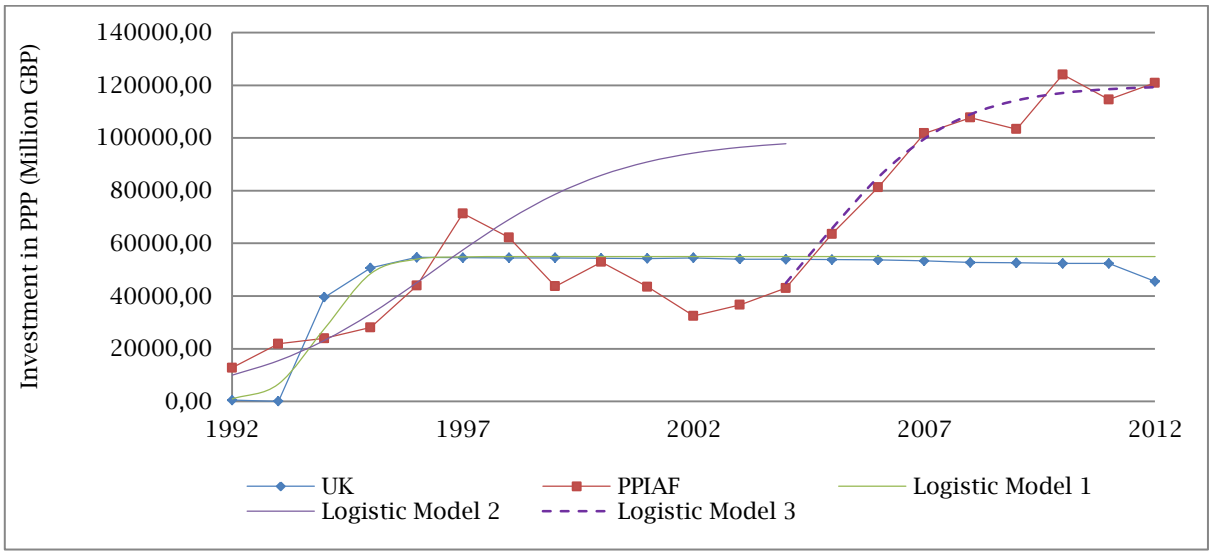
Equation 4.1 above derives from the work of Verhulst (1838) on ceilings of ecological growth (see the worker's delayed publication, Verhulst 1977). The definitional differential takes the form of Equation 3.5.2 below.

$$\dot{I} = rI_t\left(1 - {}^{I_t}/_{K}\right) \qquad (4.2)$$

All notations are maintained and $\dot{I} = dI_t \,/dt$.

The logistic curves are defined in Table 1. Initial investment (I_0) is £1 billion for the UK (Model 1), and £10 billion and £45.00 billion Models 2 and 3 respectively (PPIAF-monitored global portfolio). Parameter K is £55 billion for Model 1, and £100.00 billion and £120 billion for Models 2 and 3 respectively. Growth rate of annual investment is 2.0 for the Model 1, and 0.5 and 0.7 for the PPIAF tracking Models 2 and 3 respectively.

Figure 2. Diffusion of PPP using Logistic Model



Sources: HM Treasury (UK) and PPIAF Database

Table 1. Definition of the Logistics Curves

Logistic	***Model 1***	***Model 2***	***Model 3***
I_o (£m)	1000	10000	45000
K (£m)	55000	100000	120000
r	2	0.5	0.7
A	54	9	1.7

The trajectory analysis of Figure 1 is outside the scope of this paper (covered in Amonya 2015). This paper focuses on the K-parameter.

In the foregoing, the K-parameter is assumed constant. That is a simplification. The K-parameter captures numerous variables, which makes it a variable – particularly in the long-run. The foundational variables (feeding the K-parameter) are axiomatic – they derive from the definition of PPP. The first is state integrity. The other is private sector strength and dynamism.

The core functions of the state are control of the instruments of violence and ensuring property rights. These two axiomatically influence a country's capacity to employ PPP. The ensuing question is whether the two variables can be disentangled and measured within an investment trajectory of PPP. To that end, scholarship on Foreign Direct Investment (FDI) offers insight. Borrowing from Busse and Hefeker (2007), PPP capacity K assumes the following dynamic form:

$$\ln(K_{it}) = \beta_0 + \beta_1 ln(GNI) + \beta_2 ln(GROWTH) + \\ + \beta_3 ln(STATE) + \beta_3 ln(PRV) + e_i \qquad (4.3)$$

Where:

GNI Gross national income per capita, capturing the economic depth of the country

GROWTH Growth projections of the country, reflecting the desire for PPP

STATE The core strands of the state (security and property rights) and the effective of agency of the state (government)

PRV Depth and dynamism of the local private sector.

The orthodox H-D framework would quickly jump to testing 4.3. That would be futile. While GNI and GROWTH data are readily available (World Bank, for one source), the others are not. Capacity K should use asymptotes of curves such as in Table 1. However, such data points are too few – the present wave of PPP is hardly 15 years old (see Amonya and Okello 2014).

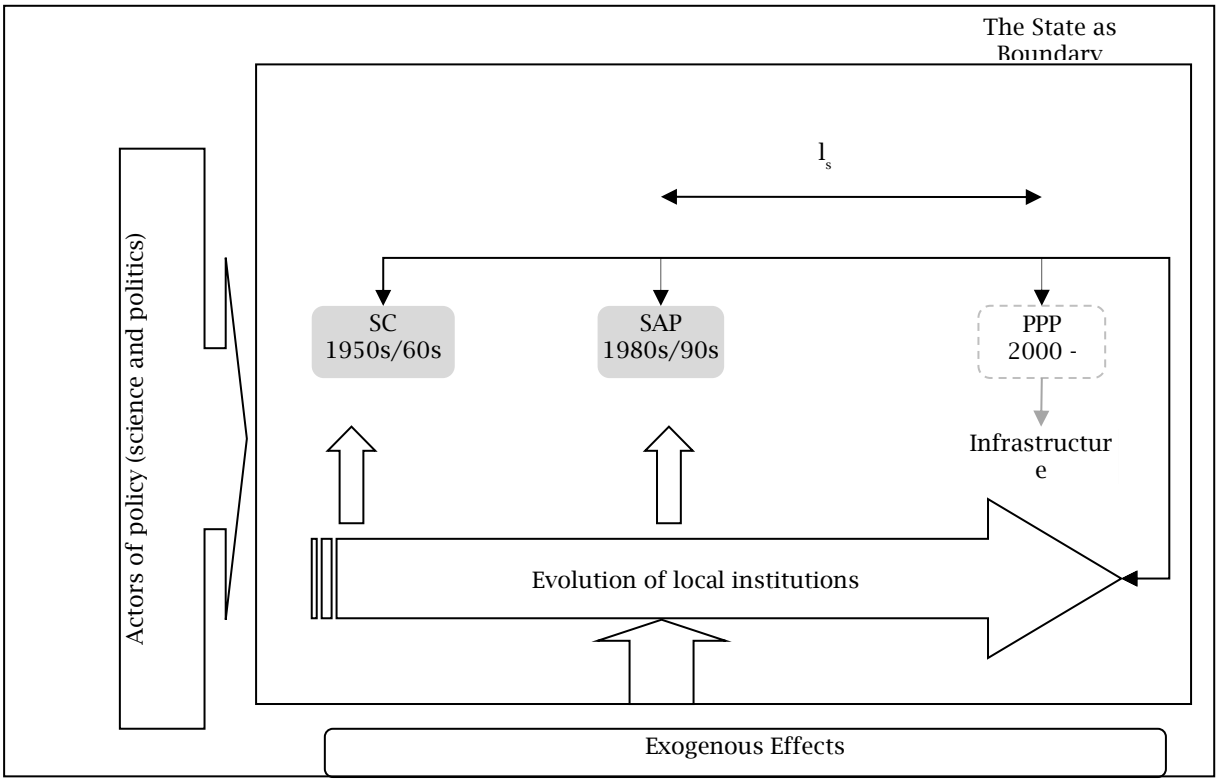
Moreover, the decomposition of STATE and PRV (as well as their potential proxies), must be developed by studying PPP phenomena in-situ and in detail. That case approach, for example, has just forced the UK to change the structure of the SPV. The new policy requires public equity on all PPP projects (see HM Treasury 2012).

In summary, the present wave of PPP intertwines with the structure of the state. In situations of developing state structures ('moulding' ones), the dynamics of PPP becomes more complex. The phenomena demand a dive into history in an attempt to explicate the complex mechanics. That is the motivation of Section 4.2.

4.2. The PPP Wave Hitting Africa

The genesis of PPP policy in Africa is captured in Figure 3. The immediate question facing the policymaker and long-term investor in Africa is the length l_s between SAP and the initiation of PPP. That concern is often fused in proxy terminologies like 'political risk' (cf. Grimsey and Lewis 2004).

Figure 3. A Sketch of Typical Policy Landscape of Africa



Notes: *SC* *Socialist Charters of the fifties and sixties*
SAP *Structural Adjustment Programme of the eighties and nineties*

The length l_s captures the conceptual difference between a SAP-induced wave and PPP at the point of analysis. In Uganda, for example, the present policy stance is against the corporatisation reforms of SAP (see Amonya 2015). In Sierra Leone the SAP reforms lag Uganda's, and hence l_s is shorter (for PPP in Sierra Leone, see Thomashausen and Shah 2014).

Moreover, to the investor, the main concern is the return (Return on Investor, ROI). The emerging formalisation is a dot product of PPP vector (**P**) and the SAP state-space (**S**). That is:

$$\boldsymbol{S}.\boldsymbol{P} = \sum_i^m S_i P_i \qquad (4.4)$$

Equation 4.4 captures the common scholarly works that employ Dephi technique and the H-D framework for generalisation (for example, see Ameyaw and Chan 2015). In that approach, the drivers of the SAP frontal (equivalent to the m-dimensions of Equation 4.4) are identified and processed through a crucible of experts. The approach is appealing to the investment decision-maker. It is simple.

However, Delphi efforts – which trace back to the struggles of the Rand Corporation in the fifties (see Dalkey and Helmer 1963) – are flawed (though not fatally, that is the essence of works like the instant). They premise on the determinism of the m variables (commonly 'critical success factors', see Chou and Pramudawardhani 2015). The socio-economic and political drivers appear at surface of a dynamical system. They are not stable (w.r.t. the long duration of PPP projects, typically 20-30 years). They are effects of evolving historical forces shown in Figure 3.

Therefore, to the long-term investor and policy-maker, the starting point should be an appreciation of the dynamical system that hides in the ubiquitous term PPP. This dynamical system formalises as follows:

$$\dot{\boldsymbol{S}}(t) = A(t)\boldsymbol{S}(t) + B(t)\boldsymbol{P}(t) + C(t)\boldsymbol{U}(t) \qquad (4.5)$$

Where:

$\boldsymbol{S}(t) \in \mathbb{R}^3$ is the state space of the market comprising three interests (private equity, public equity and debt) – the 'real' risk

$A(t) \in \mathbb{R}^{mx3}$ is a matrix of project risks distributed to the three market interests

$\boldsymbol{P}(t) \in \mathbb{R}^3$ is the impetus of PPP (funds seeking investment) - impacting the country exogenously

$B(t) \in \mathbb{R}^{mx3}$ captures PPP risk factors aligned to the three markets

$\boldsymbol{U}(t) \in \mathbb{R}^3$ is the force of technological change [exogenous] attributed to the three interests

$C(t) \in \mathbb{R}^{mx3}$ captures the environment of technological change.

The rate of change of the state-space (S-dot) is the generalised risk (on the three interests) and presented in m risk factors. The conceptual framework of Equation 4.5 challenges the dominant approach to investment decisions – prioritisation of projects based on risk analysis at the outset (see

Grimsey and Lewis 2004). The dynamical system is too complicated for decent estimation of long-term risks of PPP projects. Instead, focus should be placed on the team's ability to analyse emerging risks at any time along the project life. The strategy should be incremental management.

Moreover, the complexity of PPP captured in Equation 4.5 is still a simplification. It does not consider the controlling effects of evolving institutions. Institutions as defined by North (1990) are irrational – leading to the IRC frame of Ostrom (1991). Therefore, the state-space at the time of investment does not define future spaces (or character of investment market). That is, not even stochastic considerations can predict future spaces. Time averages are different from ensemble averages – the space is non-ergodic. Formally:

Given a measure space (X, ψ, μ), and let $T: X \rightarrow X$ be a measure-preserving transformation (mpt), the transformation is ergodic in respect to μ if:

for $E \in \psi$ and $\mu(T^{-1}E\Delta E)=0$, $\mu(E) = 0$ or $\mu(X \setminus E) = 0$.

Where: X is a set of outcomes, ψ are the events (σ-algebra subsets of X), and μ is the probability function ($\mu: \psi \rightarrow [0,+\infty]$).

In the non-ergodic situation described above, the only reliable information is the instant set of market drivers, which are also the risk factors. How then can an investor prioritise opportunities and determine the level of investment? From the public pedestal, how can the nature and extent of PPP be determined? The assumption of ergodicity must be made at the start – but only to the extent that it allows the determination of initial engagement (i.e. the nature and extent of investment, and the initial management and regulatory resources). However, looking ahead, that assumption should be removed, giving way to the reality of non-ergodicity. Now, here is the crux – the most robust preparation for the subsequent uncertainty is to knit an interdisciplinary team. The team must be capable of handling unexpected severe manifolds resulting from the known drivers and the irrationality of institutions. That team is not a collection of disciplinary 'experts'. It is a blend of individual with interdisciplinary [analytical] skills who are capable discerning the emerging manifolds. That approach would not guarantee success but it would be the best shot at it.

CONCLUSION

Non-ergodicity is not unique to Africa. However, the continent comprises the youngest independent states. That fact of age means, typically, the African state is less consolidated than most parts of the world. Consequently, exogenous excitations on policy space (such as PPP) are magnified by the underlying moulding of the state. Meanwhile, the influence of the [Northian] institutions (some of the oldest in the world) remains strong, and divorced from rationality. As a result, non-ergodicity associated with PPP is [and should be] more evident in Africa.

Given the non-ergodicity, the two main investment criteria should be the initial level of investment and the cost of maintaining the requisite team for the project. While a key determinant of the team is the initial set of drivers of change (read, risk factors), the more important determinant should be the interdisciplinarity of the team. Lining up legal, financial and technical 'experts', each absorbed in the empirics of the discipline with limited analytical (trans-disciplinary) capability leads to rigidity. The rigid structure would crack in the face of the dynamical manifolds of PPP – except that the cracks will likely manifest in project distress (often, with the people, ordinary taxpayers) picking the pieces.

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