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Can Human Development Bonds Reduce the Agency Costs of the Resource Curse?

Luke Spurduto*

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ABSTRACT

Especially in resource rich countries with weak institutions of governance, the interests of governments often diverge from those of their citizens and creditors. Sovereign bond contracts can potentially help align these interests, to the benefit of all parties, by indexing payment obligations to improvements in the health and education of the issuer's citizenry. To that end, this Essay proposes a Human Development Bond (HDB) with a variable coupon schedule that both insures issuers against recessions and incentivizes them to encourage investment in human capital when economic growth is strong. The potential benefits of such an instrument can only be realized, however, with significant support from the international community. Moreover, further empirical research is needed to calibrate the HDB's coupon schedule to provide well-timed and appropriately sized debt relief.

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Introduction

Citizens and creditors of developing countries both stand to benefit from increased investment in those citizens' health and education. Citizens benefit because investment in their human capital improves their quality of life and earning capacity. Creditors benefit when the improved earning capacity of its citizenry increases a government's ability to repay its debt. Despite these potential benefits, however, governments often succumb to political dynamics that inhibit investment in human capital, especially in resource rich countries with weak institutions of governance.¹ In other words, the interests of governments often diverge from those of their citizens and creditors. Recent shifts in sovereign borrowing patterns suggest that a Human Development Bond may serve to align these interests more effectively than alternative forms of credit.

Since the global financial crisis of 2008, governments of many low- and middle-income (LMI) countries have been issuing more bonds.² While the total amount of public and publicly-guaranteed external debt of these countries has remained relatively stable over this period, the share of that debt in bond form (rather than loans) increased from 32%, in 2009, to 44%, in 2016.³ See Figure 1.⁴ This increase reflects both a jump in the number of LMI countries with sovereign bonds outstanding and a rise in the average ratio of bonded debt to total external public debt. In Africa alone, for example, several countries issued their first dollar-denominated bonds in the years following the crisis.⁵ Over the same interval, among LMI countries with bonds outstanding in 2009, the ratio of bonded to total debt rose by an average of 8.6 percentage points, with six countries undergoing an increase of over forty

¹ See James A. Robinson, Ragnar Torvik and Thierry Verdier, *Political foundations of the resource curse*, 79 J DEV ECON 447, 450 (2006) (presenting some evidence and a model illustrating that "permanent resource booms increase resource misallocation in the rest of the economy ... because booms lead politicians to increase the extent of patronage in order to stay in power and public sector employment is relatively inefficient. [Yet] the overall impact of resource booms on the economy depends critically on institutions."); Laura Cockx and Nathalie Francken, *Extending the concept of the resource curse: Natural resources and public spending on health*, 108 ECOLOGICAL ECON 136, 137 (2014) (presenting evidence that "both natural resource abundance and dependence are associated with lower public health spending as a percentage of GDP over time [and]... evidence of an indirect effect of dependence and abundance through a deterioration of state accountability"); Laura Cockx and Nathalie Francken, *Natural Resources: A curse on education spending?*, 92 ENERGY POLICY 394, 395 (2016) ("[N]atural resource dependence is associated with lower public education expenditures relative to GDP.").

² Low- and middle-income countries are those with a GNI per capita of less than USD 12,235 in 2016, as given by the World Bank's *International Debt Statistics 2018*, available online at <https://data.worldbank.org/products/ids>. A list of such countries, indicating which ones have issued bonds since 2008, is included in APPENDIX A.

³ Author's calculations based on the World Bank International Debt Statistics database, accessible online at <http://databank.worldbank.org/data/reports.aspx?source=international-debt-statistics>.

⁴ All figures are in APPENDIX B, along with their sources.

⁵ See *Increasing debt in many African countries is a cause for worry*, THE ECONOMIST (March 8, 2018), available online at <https://www.economist.com/news/middle-east-and-africa/21738410-unfortunately-keenest-borrowers-are-also-feckless-spenders-increasing-debt> (hereafter "Increasing African debt") ("[S]ince 2006, 16 African countries have sold their first dollar-denominated bonds to foreign investors."); Rasiel Vellos, *Sub-Saharan Africa's sovereign bond issuance boom*, The Data Blog (World Bank), available online at <http://blogs.worldbank.org/opendata/sub-saharan-africa-sovereign-bond-issuance-boom>.

percentage points.⁶ For many governments in the developing world, the bond market—dominated by private institutional investors like insurance companies, pension funds and investment funds—now rivals bilateral and multilateral lenders as a source of financing. See Figure 2.

Rich countries' persistently low post-crisis interest rates are widely acknowledged as the primary driver of the growing supply of private credit to sovereigns in emerging and frontier markets.⁷ As policy rates in the United States, United Kingdom, Japan and the Eurozone converged towards zero, investors sought out riskier, higher-yielding assets wherever they could.⁸ In response to this demand, dollar-denominated sovereign yields for emerging market countries have been on a flat to mildly downward trajectory since 2009. See Figure 3. Emerging market sovereigns also capitalized on the increased demand for their debt by lengthening maturities and issuing more bonds denominated in their own currency.⁹ See Figure 4. Relative to reserve-currency debt—denominated in dollars, euros or yen—local-currency debt empowers the issuer at the expense of the investor, because it enables the issuer to inflate away the real value of its obligations. Moreover, if the instrument is governed by domestic law (rather than New York or English law, like most reserve-currency debt), the issuer may also have the power to unilaterally alter certain legal features of its obligations by passing legislation to that effect, as Greece did in 2012.¹⁰

Inflating away or legislatively modifying debt obligations are two instantiations of "a dramatic shift in the balance of power back to sovereign debtors and away from creditors."¹¹ Another aspect of that shift concerns the diminishing importance of multilateral lending. To wit, as the supply of private credit increases, multilateral lending from the International Monetary Fund (IMF) and the World Bank becomes a less essential source of financing for those developing nations with access to international bond markets. Governments of those

⁶ Author's calculations based on World Bank International Debt Statistics database (cited in note 2). Those six countries are Mongolia (4% to 44%), the Dominican Republic (6% to 57%), Jordan (3% to 51%), Romania (15% to 59%), Thailand (29% to 76%) and Belize (2% to 45%).

⁷ See Gene Frieda, *Sovereign Debt Markets*, in SOVEREIGN DEBT MANAGEMENT, eds. Rosa M. Lastra and Lee Buchheit, 293–94 (Oxford: 2014); Itai Agur, Melissa Chan, Mangal Goswami and Sunil Sharma, *On International Integration of Emerging Sovereign Bond Markets*, IMF Working Paper WP/18/18, 3–4 (2018); *Increasing African debt*, THE ECONOMIST (cited in note 5).

⁸ See Jeffrey Moore, Sunwoo Nam, Myeongguk Suh and Alexander Tepper, *Estimating the Impacts of US LSAPs on Emerging Market Economies' Local Currency Bond Markets*, Federal Reserve Bank of New York Staff Report 595 (2013) (presenting evidence "that a 10-basis-point reduction in long-term U.S. Treasury yields results in a 0.4-percentage-point increase in the foreign ownership share of emerging market debt[,] [which] in turn, is estimated to reduce government bond yields in EMEs by approximately 1.7 basis points."); *Kings of the wild frontier*, THE ECONOMIST (March 2, 2013), available online at <https://www.economist.com/news/finance-and-economics/21572789-search-yield-has-taken-investors-exotic-territory-kings-wild> ("The hunt for bonds that pay more interest to retirees has taken mainstream pension funds beyond the rich world, past markets that are merely emerging, to "frontier markets" where the rewards—and the risks—are greater.").

⁹ See Frieda, *Sovereign Debt Markets* at 294 (cited in note 7).

¹⁰ See id.; Jeromin Zettelmeyer, Christoph Trebesch and G. Mitu Gulati, *Managing Holdouts: The Case of the 2012 Greek Exchange*, in SOVEREIGN DEBT MANAGEMENT, eds. Rosa M. Lastra and Lee Buchheit, 28 (Oxford: 2014) ("[T]he Greek legislature passed a law on 23 February 2012 (the Greek Bondholder Act 2012 [sic]) that imposed [collective action clauses] on all of Greece's local law bonds.").

¹¹ Frieda, *Sovereign Debt Markets* at 294 (cited in note 7).

nations are thereby (slightly more) empowered to eschew the monetary and fiscal reforms long demanded of distressed sovereign debtors as a condition of borrowing from the Bretton Woods institutions.¹² The ability of these institutions (and the Paris Club of bilateral creditors) to promote debt sustainability and economic development through debt relief is correspondingly curtailed.¹³

Depending on one's view of structural adjustment programs and conditionality, their marginalized impact may represent new challenges, new opportunities or both. To the extent that conditional lending improves fiscal discipline and macroeconomic stability¹⁴, the challenge for sovereign bond design is to replicate these salutary impacts on the borrower's ability to repay. Equally, to the extent that structural adjustment programs foster economic growth without decreasing poverty¹⁵, the shift to private credit presents an opportunity for governments to commit to financing themselves in ways that promote more inclusive growth. In any event, "[c]are will be needed," scholars and policymakers agree, "to reduce the risk that [developing] countries do not undertake new financing that may lead to a build-up of future unsustainable debt."¹⁶

In theory, contracts governing sovereign bonds have always been available as means by which a sovereign borrower might signal its commitment to policies beneficial to creditors

¹² See Olivier Jeanne, Jonathan Ostry and Jeromin Zettelmeyer, *A Theory of International Crisis Lending and IMF Conditionality*, IMF Working Paper No. 08/236, 5–6 (2008) ("Beginning in the late 1950s, ... explicit (and typically quantitative) fiscal and monetary "performance criteria" ... set a verifiable standard for when an arrangement could be discontinued. In other words, the policy effort that the IMF expected countries to exert in order to be able to draw from the Fund was explicitly written into the arrangement.").

¹³ See Thomas A. Duvall, *Debt Relief for Low-Income Countries*, in SOVEREIGN DEBT MANAGEMENT, eds. Rosa M. Lastra and Lee Buchheit, 69 (Oxford: 2014) (discussing the Heavily Indebted Poor Countries (HIPC) Debt Initiative and the Multilateral Debt Relief Initiative, which aimed "to reduce the overall debt of eligible countries to a sustainable level once they completed an extended period of strong policy performance, including the sustained implementation of macroeconomic policies, together with structural and social policy reforms").

¹⁴ Compare Jeanne, Ostry and Zettelmeyer, *IMF Conditionality* at 6 (cited in note 12) ("Although the ultimate effect of IMF programs on economic outcomes has been controversial, the fact that agreed performance criteria have generally had a commitment effect on country policies is not. Furthermore, the fact that the IMF has generally been repaid in full constitutes prima facie evidence that IMF conditionality was effective by the standards of its original purpose, namely, to safeguard Fund resources.") with William Easterly, *IMF and World Bank Structural Adjustment Programs and Poverty*, in MANAGING CURRENCY CRISES IN EMERGING MARKETS, eds. Michael P. Dooley and Jeffrey A. Frankel, 365 (Chicago: 2003) (pointing to "a long and inconclusive literature [finding] no systematic effect of adjustment lending on growth").

¹⁵ See Easterly, *IMF and World Bank Structural Adjustment Programs and Poverty* at 367 (cited in note 14) ("The absolute value of the growth elasticity of poverty declines by about two points for every additional IMF or World Bank adjustment loan per year. ... This means that the poor benefit less from expansions during a structural adjustment program than in expansions without an adjustment program, while they are at the same time hurt less by contractions."). See also Jeanne, Ostry and Zettelmeyer, *IMF Conditionality* at 6 (cited in note 12) ("IMF conditionality was not designed to minimize moral hazard with respect to third parties, such as other countries, private creditors, or, in borrowing countries with less-than benevolent governments, the citizens of those countries.").

¹⁶ Duvall, *Debt Relief* at 69 (cited in note 13).

(or citizens).¹⁷ But whereas those commitments were once embodied (or neglected) in loan covenants and structural adjustment programs¹⁸, the post-crisis shift in borrowing patterns and creditor compositions renders bond contracts more influential signals, for more governments, than they were previously. With the exception of headline issues like collective action clauses¹⁹, *pari passu* interpretations²⁰ and the potential of GDP-linked bonds²¹, however, contract design remains an underexplored tool for addressing the challenges and opportunities of the new sovereign debt market.²²

The aim of this Essay is to evaluate whether a sovereign bond with payment obligations linked to the issuer's Human Development Index can signal, to citizens and creditors, a credible commitment to improve citizens' productive capacity. Specifically, the Human Development Bond (HDB) contemplated in Part II (below) would adjust the size of bondholders' claims to reflect changes in human development and GDP growth within the issuing country, as follows. When GDP growth over the life of the instrument is low, bondholders' claims diminish, regardless of improvements in human development. When GDP growth over the life of the instrument is high, bondholders' claims increase, unless human development has improved, in which case claims are reduced in proportion to that improvement. This design incentivizes the government to encourage investment in human capital by penalizing it with higher debt obligations if it enjoys sufficient growth, but nonetheless fails, to do so. Acknowledging that investment is harder to stimulate when growth is low, the HDB also insures the sovereign borrower against procyclical fiscal policy by reducing debt obligations when growth is low.

Thus designed, the HDB embodies the issuing government's commitment to improve

¹⁷ These contracts include not only the Fiscal Agency Agreement (FAA), Trust Indenture or Trust Deed that governs the issuer's obligations to pay and bondholders' rights to initiate legal action in the event of default; they also include the offering memorandum and pricing supplements that must be distributed to prospective investors and, if the notes are not privately placed, registered with a national regulator under applicable securities laws. Indeed, the offering memorandum—which enumerates risk factors and explains the legal features of the bonds—is more accessible to investors and civil society groups, and thus potentially more impactful for signaling purposes. For a discussion of FAAs versus trust structures, see *Sovereign Debt Restructuring: Further Improvements in the Market Based Approach*, U.N. Department of Economic and Social Affairs, 11–12 (2017), available online at http://www.un.org/esa/ffd/wp-content/uploads/2017/09/EGM_sovereign-debt_Technical-study-group-report-30Aug2017.pdf.

¹⁸ See, for example, Easterly, *IMF and World Bank Structural Adjustment Programs and Poverty* at 364 (cited in note 14) ("Conditionality associated with these loans is well known: macroeconomic conditions like reduced budget deficits, devaluation, and reduced domestic credit expansion, and structural conditions like freeing controlled prices and interest rates, reducing trade barriers, and privatizing state enterprises."); Duvall, *Debt Relief* at 76 (cited in note 13) ("[D]ebt relief provided under the Enhanced HIPC Debt Initiative was expected to be part of a broader ... country-driven poverty reduction strategy, ... oriented to achieve outcome-related goals for poverty reduction.").

¹⁹ See, for example, Anna Gelpern, Ben Heller and Brad Setser, *Count the Limbs: Designing Robust Aggregation Clauses in Sovereign Bonds*, in *TOO LITTLE, TOO LATE: THE QUEST TO RESOLVE SOVEREIGN DEBT CRISES*, eds. Martin Guzman, Jose Antonio Ocampo and Joseph E. Stiglitz (Columbia: 2016).

²⁰ See, for example, Lee C. Buchheit and G. Mitu Gulati, *Restructuring sovereign debt after NML v Argentina*, 12 CAP MKTS LJ 224 (2017).

²¹ See Part I.B, *infra*.

²² But see Stephen Choi, Mitu Gulati and Eric Posner, *The Evolution of Contractual Terms in Sovereign Bonds*, 4 J LEGAL ANALYSIS 131 (2012).

human development, as measured by the Human Development Index.²³ It is far from obvious, however, that such a commitment is (i) valuable or (ii) credible. *Valuable* means that such improvement affects economic growth in ways that benefit citizens and creditors. *Credible* means that, after the commitment has been made, it remains worthwhile for the government to actually follow through by investing (or encouraging investment) in health and education. Only if the commitment is both credible and valuable will citizens have reason to reward an HDB-issuer politically (in the form of popular support) and investors have reason to purchase the instrument. To evaluate the value and credibility of the commitment to human development embodied in the HDB, this Essay proceeds as follows.

After Part I reviews the literature on (A) the political economy of the resource curse and (B) GDP-linked bonds, Part II posits an HDB coupon schedule responsive to certain findings of that research. The posited coupon schedule helps concretize some of the inevitable logistical challenges of an HDB. Logistical challenges notwithstanding, Part III addresses the theoretical viability of the HDB by introducing a standard agency cost framework. With the help of two motivating examples adapted from Jensen and Meckling (1976), it analogizes government to the owner-manager of a firm, citizens to outside shareholders and sovereign debt investors to corporate bondholders.²⁴ Thus, the agency costs of outside equity (for a firm) provide a model to assess the value and credibility of the HDB to citizens of the issuer. Similarly, the agency costs of debt (for a firm) provide a model to assess the value and credibility of the HDB to investors. The analogy to the corporate context is far from perfect²⁵, but it illustrates the conditions under which HDBs could combat the vicious cycle of underinvestment that dogs many resource rich countries.

Namely, for citizens to find the HDB valuable, it must not only increase their life expectancy and years of schooling; it must do so within a macroeconomic context in which those improvements increase citizens' earning capacity. For citizens to find the HDB credible, the debt relief granted for a given quantum of human development must exceed the cost to the government of inducing that development, and the penalty for fraud must exceed the benefit of any debt relief obtained thereby. But citizens' perspectives on the HDB are irrelevant unless investors are willing to purchase it at a price acceptable to the sovereign issuer. The value of the HDB to investors mimics that of the financial covenants ubiquitous in corporate debt agreements; as covenants deter management from substituting risky assets for safe ones, the HDB deters government officials from favoring extractive industries at the expense of human development. To the extent human development increases the rate and stability of economic growth (or expectations thereof) within the tenor of the instrument, creditors have reason to reduce the yield they demand on an HDB (relative to a GDP-linked bond without human development incentives). Finally, creditors find the HDB credible under

²³ See *Human Development Report 2016: Technical Notes*, United Nations Development Programme, available online at <http://hdr.undp.org/en/data>. The Human Development Index is a geometric mean of three sub-indices: the health index (reflecting life expectancy at birth); the education index (reflecting mean years of schooling and expected years of schooling); and the GNI index (reflecting income per capita). The HDB design contemplated in Part II emphasizes the health and education indices.

²⁴ Michael C. Jensen and William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure*, 3 J FIN ECON 305, 308 (1976).

²⁵ See Mitu Gulati and George Triantis, *Contracts Without Law: Sovereign versus Corporate Debt*, 75 U CINCINNATI L REV 977, 985 (explaining the analogy but cautioning that "current and future citizens have a conflict of interest that is absent in the case of shareholders").

the same conditions that citizens find it credible, which conditions depend on careful calibration of the coupon schedule and significant support from the international legal and financial communities.

Part IV briefly addresses the importance of robust monitoring by the United Nations and the Bretton Woods institutions to avoid fraudulent manipulation of the data informing the HDB coupon schedule. It concludes by acknowledging that those countries that stand to benefit most from issuing an HDB are likely to be those with the least reliable data, suggesting that data integrity initiatives are key to the practical feasibility of such an instrument.

I. Literature Reviews

The following literature reviews frame some theoretical and empirical results regarding (A) the political economy of the resource curse and (B) the potential pitfalls and benefits of GDP-linked bonds. These results inform the design of the HDB posited in Part II, as well as the arguments for and against the HDB that follow in Part III.

A. The divergence between government officials' private incentives and the interests of citizens and creditors is often exacerbated by natural resource wealth.

To make things simple, assume that citizens just care about their wealth. Existing bondholders just care about changes in the sovereign's default risk that make their bonds more or less valuable on the secondary market.²⁶ Government officials too care about their own wealth, which means that they also care about staying in power—either innocently (because they believe their political opponents will crash the economy and make everyone worse off) or selfishly (because the longer they are in power the more they can enrich themselves and their social group). Under these simplifying assumptions, it would seem that all three groups—citizens, bondholders and government officials—share an interest in strong economic growth. But the nature and timing of economic growth affect who benefits most, and this is where interests diverge.

Generally, citizens as a constituency benefit most from broad-based growth that they share in and help create, usually by contributing their labor to private enterprises and earning wages.²⁷ They benefit least from growth in concentrated, capital-intensive industries.²⁸

²⁶ See Felix Salmon, *Stop Selling Bonds to Retail Investors*, 35 GEO J INT'L L 837, 839 (2004) (noting that, in contrast to retail investors, institutional investors, who dominate the market for sovereign bonds, rarely hold debt to maturity). Prospective investors have a more complex set of concerns, including whether a particular debt instrument offers any scope for diversifying their portfolio. See Part I.B, *infra*.

²⁷ See *Fostering Inclusive Growth*, IMF Staff Notes for G-20 Leaders Summit, 9 and 17 (2017) (presenting evidence that "[h]igh and persistent inequality can have significant negative implications for both longer-term growth and macroeconomic stability," and that "[a]cross countries, those with lower shares in labor income have tended to also experience higher inequality levels in both market income as well as disposable income ... [while] [w]ithin countries, increases in labor income shares have been associated with declines in income inequality").

²⁸ See *The Growth Report: Strategies for Sustained Growth and Inclusive Development*, Commission on Growth and Development, 14 (2008) ("[S]ome kinds of growth reduce poverty more effectively than others. ... The expansion of smallholder farming, for example, cuts poverty quickly, raising the incomes of rural cultivators and reducing the price of the poor's food bill. Growth in labor-intensive

Concentrated growth reaches the rest of the population mainly through the government (if at all), in the form of direct transfers, public sector employment and other public expenditures. This is suboptimal from the citizens' perspective, not only because transfers can distort citizens' private investment decisions²⁹, government jobs are inefficient and taxation creates deadweight losses, but also because broad-based, inclusive growth tends to last longer than concentrated growth (see Figure 5).³⁰ And persistent growth is essential for raising the living standards of entire populations.³¹ Thus, relative to bondholders and governments, citizens have the greatest interest in long-term growth.

Because bondholders' claims are paid by the government, anything that increases the government's ability to pay benefits bondholders. This includes not just current economic growth (which raises tax revenues), but also expected future growth (which increases the government's ability to "roll over" its debt by re-borrowing to finance current debt obligations). To the extent that international capital markets charge more to rollover debt as the volatility of the issuer's national income increases, existing bondholders prefer stable to volatile growth.³² For the most part, though, bondholders' interest in long-term economic growth is limited by the tenor of their claims. Moreover, they do not care about the distribution of gains across the citizenry, except insofar as that distribution has growth consequences that are realized (or factored into expectations about the future) before their bonds mature.

Finally, self-interested government officials are typically assumed to care about short-term growth (that occurs while they are in office), with their interest in long-term growth limited by the extent they can use it to stay in office. Scholars of political economy postulate that, upon gaining power, politicians would expropriate as much public revenue for themselves as possible, were they not constrained from doing so by strong institutions of governance (*e.g.*, constitutional checks and balances, electoral integrity, free press, vigorous civil society, *etc.*) and the desire to continue enriching themselves and their associates in the future.³³ The stronger the governance institutions, the more politicians need genuine popular

manufacturing also raises the incomes of the poor. The expansion of capital-intensive mining industries, on the other hand, can result in jobless growth, making little impression on poverty.")

²⁹ See Salim M. Araji and Hamid Mohtadi, *Natural Resources, Incentives and Human Capital: Reinterpreting the curse*, 10 MIDDLE EAST DEV J 1 (2018).

³⁰ See Andrew G. Berg and Jonathan D. Ostry, *Inequality and Unsustainable Growth: Two Sides of the Same Coin?*, IMF Staff Discussion Note SDN/11/08, 13 (2011) (presenting evidence that "a 10-percentile decrease in inequality ... increases the expected length of a growth spell by 50 percent").

³¹ See *id.* at 5 ("For significant poverty reduction, the key is to achieve rapid growth *over long periods of time.*"); *The Growth Report* at 14 (cited in note 28) ("However growth starts, sustaining it will usually require mass job creation, raising the scarcity value of labor. As a result, wages rise, spreading the proceeds of growth more widely. In short, the most propoor growth is sustained growth.").

³² See Luis Cataño, Ana Fostel and Romain Ranciere, *Fiscal Discoveries and Yield Decouplings*, 65 IMF ECONOMIC REV 704, 706 (2017) ("[B]orrowing buys the option of defaulting, and the value of that option rises on the volatility of the income shock."). These authors argue that both the stochastic volatility and persistence of tax revenues are key for explaining the decoupling of Eurozone sovereign yields after the 2008 crisis. *Id.* at 708. See also Cristina Arellano, *Default Risk and Income Fluctuations in Emerging Economies*, 98 AMERICAN ECON REV 690 (2008).

³³ See, for example, Antonio Cabrales and Esther Hauk, *The Quality of Political Institutions and the Curse of Natural Resources*, 121 THE ECON J 55, 61 (2010) ("Politicians are purely self-interested and would like to consume the returns from the resource wealth themselves but political pressure obliges them to redistribute at least a part of it to voters."); James A. Robinson and Ragnar Torvik, *White*

support to stay in power.³⁴ To maintain popular support, politicians distribute public revenue to citizens in the form of direct transfers, subsidies, government jobs, purchases of goods and services and investments in infrastructure and other public goods.³⁵ Current economic growth, while they are in office, replenishes public coffers and loosens politicians' budget constraint, enabling them to expropriate more for themselves and purchase more popular support (increasing their chances of staying in power).³⁶ Future economic growth, however, is valuable to politicians only insofar as they can borrow against it to finance current expenditures or otherwise invoke it to garner popular support in the present. One way to use expected future growth to garner reelection support is to commit to expenditures or investments that benefit constituents only if the government stays in power.³⁷ Relative to citizens' growth preferences, then, governments are assumed to prefer shorter-term growth and growth that only reaches citizens through government spending and patronage.

A vast literature formalizes these incentives and their role in preventing some resource rich countries from achieving sustained economic growth.³⁸ For present purposes, the most germane models of the political dimensions of the resource curse illustrate the following three dynamics: (i) *incumbent governments face a political imperative to credibly commit to expenditures that only benefit constituents if the government stays in power*; (ii) *this imperative tends to produce a bloated public sector and underinvestment in education*; and (iii) *a bloated public sector and a shortage of human capital are detrimental to both the stability and rate of long-term economic growth*. The misallocation of public resources to serve political ends is a risk for any polity, but it is compounded by other symptoms of the resource curse, including: a domestic manufacturing sector stunted by Dutch Disease effects³⁹; governance institutions captured by private

Elephants, 89 J PUBLIC ECON 197, 201–02 (2005) ("We [assume] that politicians maximize a weighted sum of their own welfare and the welfare of the group they represent, but where their own welfare is most important."); Robinson, Torvik and Verdier, *Political foundations of the resource curse* at 449 (cited in note 1) ("Resource income can be used in either of two ways; the incumbent can 'consume' the income or he can distribute it as 'patronage' to influence the outcome of the election.").

³⁴ See Robinson, Torvik and Verdier, *Political foundations of the resource curse* at 450 (cited in note 1) ("[I]nstitutions ... determine the extent to which political incentives map into policy outcomes. The relevant institutions here will be political ones which promote the accountability of politicians, and generally develop state institutions away from patrimonial practices towards the use of rational and meritocratic criteria in allocating public sector resources."); Hans Gersbach, *Competition of politicians for incentive contracts and elections*, 121 PUBLIC CHOICE 157, 159 (2004) ("Politicians and voters are assumed to have divergent interests, and elections are means by which voters control politician misbehavior, since the possibility of reelection induces self-interested politicians to act on behalf of the interests of the electorate.").

³⁵ See, for example, Cabrales and Hauk, *The Quality of Political Institutions* at 61 (cited in note 33) ("This redistribution can take the form of: (i) a direct transfer or (ii) a subsidy for the investment in human capital, which has a positive spillover on the entire population.").

³⁶ See, for example, Gersbach, *Competition of politicians* at 161 (cited in note 34) ("[T]he politician is genuinely concerned about the social returns he generates as long as the outcomes of policies occur while he is in office.").

³⁷ See notes 46–51, *infra*, and accompanying text.

³⁸ See, for example, Paul Collier, *The Political Economy of Natural Resources*, 77 SOCIAL RESEARCH 1105 (2010); Michael Ross, *The political economy of the resource curse*, 51 WORLD POLITICS 297 (1999).

³⁹ See Jeffrey D. Sachs and Andrew M. Warner, *Natural Resource Abundance and Economic Growth*, NBER Working Paper 5398 (1995).

interests and weakened by rent-seeking⁴⁰; and violent conflict.⁴¹ Consider how these difficulties exacerbate the three main political dynamics of interest.

- i. *Incumbent governments face a political imperative to credibly commit to expenditures that only benefit constituents if the government stays in power.*

In any regime where political leadership depends (even nominally) on popular support, politicians and citizens may attempt to overcome their divergent interests by striking a bargain. Constituents would like to promise to vote for (or not revolt against) the politician if and only if he implements policies that benefit them, and the politician would like to promise to implement such policies if and only if the constituents vote for him. The problem is that both parties face a commitment problem, in the sense that once one party performs, it may no longer be rational for the other to follow through. An elected politician, for example, may find it prohibitively inconvenient to follow through on campaign promises, just as a constituent whose vote has been "bought" in advance may not vote as promised. Because such promises are not legally enforceable, they must be self-enforcing to be of any benefit at all:

For politicians to ensure that they have the support of a group of citizens, they must be able to use policies that tie the continuation utility of a voter to their political success For citizens to ensure that politicians honor their promises, the policies must be *ex post* rational for the politicians to implement.⁴²

In other words, only promises that remain compatible with the promisor's incentives (even after the promisee has performed) can be relied upon to induce the desired behavior from the promisee.⁴³

Certain policies are more incentive-compatible than others. Gersbach (2004) presents a model in which the disparity between the discount rates of citizens and politicians renders it impossible for citizens to use elections alone to induce politicians to undertake long-term investments. He demonstrates that promises to undertake long-term investments become credible if campaigning politicians are allowed to offer a binding "incentive contract stipulat[ing] that in the event of reelection the politician's utility or income in the [post] election period depends on policy returns such as the level of unemployment."⁴⁴ Contrast Gersbach's model with Aidt and Dutta (2007), who assume that even if politicians and citizens have the same discount rate, "rational voters [may] deliberately ask their politicians to be myopic," because short-term investment returns are easier for the citizenry to monitor (and vote on the basis of) than long-term investment returns. There is an accountability rationale for why "public spending is biased against long-term investments."⁴⁵

⁴⁰ See Aaron Tornell and Philip R. Lane, *The Voracity Effect*, 89 AMERICAN ECON REV 22 (1999).

⁴¹ See Paul Collier and Anke Hoeffler, *Resource Rents, Governance and Conflict*, 49 J CONFLICT RESOLUTION 625 (2005).

⁴² James A. Robinson and Thierry Verdier, *The Political Economy of Clientelism*, 115 SCAND J ECON 260, 261 (2013).

⁴³ See Patrick Bolton and Mathias Dewatripont, *CONTRACT THEORY*, 23 (MIT: 2005) (introducing the incentive compatibility and individual rationality constraints algebraically).

⁴⁴ Gersbach, *Competition of Politicians* at 158 (cited in note 34). Gersbach's analysis encompasses "contracts [that] can be conditioned on social returns measured for instance by GDP growth or criminal statistics," while conceding that such contracts "have no counterpart in reality." *Id.* at 159, 161.

⁴⁵ Toke S. Aidt and Jayasri Dutta, *Policy myopia and economic growth*, 23 EURO J POL ECON 734 (2007).

In a related line of research, Professor James Robinson and his co-authors develop a series of arguments to the effect that "a desire to make political exchanges incentive-compatible" explains why politicians choose economically inefficient mechanisms to purchase popular support.⁴⁶ Robinson and Torvik (2005) argue that neither direct transfers nor profit-making investment projects are as effective as *loss-making* investment projects for garnering the reliable support of constituents. Direct transfers are not credible promises because the politician, once elected, has little to gain from continuing the transfer. Foreseeing this, citizens are unlikely to be moved by promises of future tax cuts or public benefits increases.⁴⁷ A socially efficient investment initiated by an incumbent pre-election (in a new state-owned power plant or road in his district, for example) is a credible promise to complete the investment and operate the new infrastructure post-election. However, it is not a promise that will induce much voter loyalty, because the profitability of the project ensures that it will be undertaken no matter who wins the election, so voters stand to benefit even if the incumbent loses. A socially *inefficient* investment project, on the other hand, may benefit an incumbent's district at the expense of the rest of the country, such that it will be completed and operated if and only if the incumbent wins.⁴⁸ Robinson and Torvik demonstrate that the more natural resource endowments increase "the rents from being in office, the more likely is it that loss making public projects are undertaken. Public projects, even if highly inefficient, may be an efficient political strategy to secure rents from being in office."⁴⁹

A similarly inefficient but more targeted way to purchase popular support is simply to hire voters to work for the government. When the political utility of hiring a voter exceeds the economic utility of taxing her private sector wages, incumbent politicians may be inclined to expand public sector hiring. Moreover, once incumbent politicians hire public sector employees, the political costs of firing them may outweigh the economic benefits of a more streamlined bureaucratic corps.⁵⁰ Under these conditions, natural resource wealth widens the gap between politically and economically efficient public sector hiring practices. Robinson, Torvik and Verdier (2006) explain that:

Since a long-lasting or an anticipated resource boom increases the rents from being in power, the incumbent politician has an incentive to influence the votes of more people by employing them in the public sector. Although this is good for the clients that receive jobs and the incumbent who is more likely to be re-elected, these deals decrease the efficiency of the economy by transferring labor from the relatively high productivity private sector to the low productivity public sector.⁵¹

Furthermore, to the extent that labor-intensive domestic manufacturing of tradable goods increases worker productivity through learning-by-doing on the job, commodity booms (that increase demand for, and divert labor toward, non-tradable production with fewer positive

⁴⁶ Robinson and Verdier, *Political Economy of Clientelism* at 285 (cited in note 42).

⁴⁷ See *id.* at 268–69 (arguing that if politicians "attempt to maximize their expected consumption" and "their consumption consists of tax revenues minus transfers plus total profits from public employment," then any "promise a patron makes to transfer income when in power in exchange for votes is not credible. This will have the effect of ruling out as not credible any offer of transfers for support."). Moreover, it may be difficult to channel direct transfers such that they reach only the politician's supporters. If transfers cannot be targeted in this way, then the politician's promise (even if credible) is not a reason for citizens to vote for him, because they will benefit from his election even if they vote for his opponent.

⁴⁸ See Robinson and Torvik, *White Elephants* at 209 (cited in note 33).

⁴⁹ *Id.* at 207.

⁵⁰ See Robinson, Torvik and Verdier, *Political foundations of the resource curse* at 454 (cited in note 1).

⁵¹ *Id.* at 459.

spillovers) can depress economy-wide productivity and wages.⁵² This reduces both the direct cost of hiring a public sector employee (*i.e.*, the public sector wage required to lure her away from private sector employment) and the opportunity cost of doing so (*i.e.*, the foregone tax revenue that would have been collected from her private sector wages), making political patronage more viable in resource cursed countries with low wages.⁵³

ii. *This imperative tends to produce a bloated public sector and underinvestment in education.*

Empirical observation confirms that public sectors tend to become overextended when patronage is the primary mode of political exchange.⁵⁴ And, whether due to public sector unions or simply the political costs of personnel cuts, "once public employment increases, it takes a long time to be reduced."⁵⁵

Though public spending in resource rich countries tends to be inflated by the politics of patronage, very little is spent on education or health, especially in poorer countries.⁵⁶ See Figure 6. Atolia *et. al.* (2007) argue that the tendency of LMI countries to spend public revenue on physical infrastructure (such as roads, power and telecommunications) rather than on schools and hospitals is due to the more immediate growth effects and reduced debt burden associated with the former. They estimate that:

If public investment is made exclusively in schools, it results in a much larger long-run increase in output than in an opposite scenario in which public investment occurred exclusively in roads. Yet, for a prolonged time (around 15 years) the economy enjoys faster growth by investing only in roads, and it takes about a generation (almost 24 years) for the output obtained by investing in schools to overtake that delivered by investing in roads. This has tremendous fiscal implications, with schools causing a threefold peak increase in government debt relative to roads.⁵⁷

Whereas investment in physical infrastructure increases the profitability of firms almost immediately, investment in human capital increases workers' productivity only with a delay, so debt financing plays a greater role in human capital investment. This means that countries with debt sustainability issues (aka "debt intolerance") may face credit constraints preventing them from investing in schools:

Multilateral agencies could alleviate these concerns and incentivize policymakers in developing countries to undertake long-term investment in schools by providing tied concessional financing and grants. While tying aid to investment in schools would address the issue of myopia,

⁵² See Sachs and Warner, *Natural Resource Abundance* at 6 (cited in note 39); Ragnar Torvik, *Why Do Some resource-abundant countries succeed while others do not?*, 25 OXFORD REV ECON POL 241, 251 (2009) (explaining a canonical Dutch Disease model). But see Paul Mosley, *FISCAL POLICY AND THE NATURAL RESOURCES CURSE*, 1 (Routledge: 2017) ("Dutch Disease is not an inevitable outcome of having a booming natural resource sector. The governments of several developing economies with booming natural resource sectors, notably Indonesia, Brazil and China, have aggressively devalued their exchange rates so as to protect their dynamic traded-goods sectors.").

⁵³ See Robinson, Torvik and Verdier, *Political foundations of the resource curse* at 454 (cited in note 1).

⁵⁴ See *id.* at 464 (collecting evidence about public sector expansions in Nigeria, Venezuela, Mexico, Trinidad and Tobago, Ecuador and Zambia).

⁵⁵ Alberto Alesina, Stephan Danninger and Massimo Rostagno, *Redistribution Through Public Employment: The Case of Italy*, 48 IMF Staff Papers 447, 449 (2001).

⁵⁶ See Cockx and Francken, *Extending the concept of the resource curse* at 137 (cited in note 1); Cockx and Francken, *Natural Resources: A curse on education spending?* at 395 (cited in note 1).

⁵⁷ Manoj Atolia, Bin Grace Li, Ricardo Marto and Giovanni Melina, *Investing in Public Infrastructure: Roads or Schools?*, IMF Working Paper WP/17/105, 6–7 (2017).

concessional terms would mitigate concerns of debt intolerance.⁵⁸

As argued in Part III.C, below, even private creditors might find it worthwhile to offer tied concessional financing (in the form of an HDB), provided the human capital investment improves or stabilizes growth quickly enough.

Note that underinvestment in education is not just a tendency of present-oriented, credit-constrained governments, but of their citizens as well. Private investment in education is determined by the returns expected in the form of higher future wages. But one individual's education, like her health, creates considerable positive externalities for society, such that much of the social benefit created by improvements in her productivity is not reflected in her wages.⁵⁹ And to the extent that it is, the wage increase may be too delayed, too small or too uncertain to offset the upfront costs of forgoing work and going to school. In such conditions, demand for education is below the socially optimal level, so focusing on the supply of education is a limited growth strategy. In other words, public spending on schools and teachers can only improve human capital so much; eventually, it becomes more cost-effective to focus on increasing private demand for education by bolstering the industries that hire graduates.

For example, capital-intensive extractive industry tends to employ fewer and higher-skilled employees than less capital-intensive manufacturing⁶⁰, so "the labour market in a capital-intensive economy offers little benefit for moderate levels of education."⁶¹ Without job prospects that reward marginal investments in education, citizens are less inclined to educate themselves, and the country's productive capacity deteriorates with the depreciation of its human capital. This will occur even with free, fully state-funded, legally compulsory education, because the quality of learning declines if citizens see no reason to put in the personal effort required to convert education from a consumption good to an investment. On the flip side, if the government could commit to an inclusive growth strategy based on increasing the returns to education—by subsidizing both its cost *and* the industries that reward incremental improvements⁶²—individuals would find investment in education more

⁵⁸ Id. at 28.

⁵⁹ One individual's education, for instance, increases both her own and her colleagues' productivity, because it is more efficient to collaborate with better-trained people. Likewise with health: If one gets sick, others may be more likely to get sick as well, or they may lose productivity due to the absence of their sick coworker or the inexperience of her replacement.

⁶⁰ Mosley, *FISCAL POLICY AND THE NATURAL RESOURCES CURSE* at 4 (cited in note 52) ("The issue is that mining, and more particularly, oil and gas extraction often generate little benefit for the populations of poor countries, and especially their poorest people, because they are capital intensive or, otherwise put, take on very little labour—which is a problem because labour is the only thing which the poorest people are able to sell.").

⁶¹ Nancy Birdsall, Thomas Pinckney and Richard Sabot, *Natural Resources, Human Capital, and Growth*, 58, in *RESOURCE ABUNDANCE AND ECONOMIC DEVELOPMENT*, ed. R. M. Auty (Oxford: 2004).

⁶² See Mosley, *FISCAL POLICY AND THE NATURAL RESOURCES CURSE* at 213–14 (cited in note 52) ("[T]he countries which, like Indonesia and Mauritius, focused their subsidies on exporters and combined them with a consistently competitive [*i.e.* low] exchange rate were the most successful at export diversification, and more successful than those which, like Ghana, maintained a competitive exchange rate, but did not target their subsidies on exporters."). But see *The Growth Report* at 50–51 (cited in note 28) ("At best, management of the exchange rate can be used for two purposes. One is to tip the balance slightly in favor of exports in the early stages of growth The other is to prevent a surge of capital inflows (which may be transitory) from disrupting the profitability and growth of the export sectors. ... The goal of an export-led strategy is not to increase reserves or to run a trade

attractive, and long-run productivity and growth may improve.

- iii. *A bloated public sector and a shortage of human capital are detrimental to both the stability and rate of economic growth.*

As the preceding discussion suggests, low levels of human capital make it difficult for countries to convert natural resource wealth into sustained economic growth.⁶³ See Figure 7. There is also empirical support for the narrower propositions that, all else equal, (a) "countries with higher initial levels of schooling experienced faster growth in more compared to less schooling-intensive industries in the 1980s and 1990s;" and, (b) "countries that saw greater improvements in schooling experienced faster shifts in production toward schooling-intensive industries."⁶⁴ Thus, insofar as sustained economic growth requires shifting workers from less schooling-intensive industries (such as "leather, apparel, footwear, and textiles") to more schooling-intensive industries (like "petroleum refineries, printing and publishing, and (industrial and other) chemicals"), raising the average years of schooling of the population is likely to help.⁶⁵

Lastly, evidence suggests a reciprocal causality between the size of the public sector and the volatility of GDP growth. GDP volatility appears to augment expansions of the public sector⁶⁶, while a larger public sector also amplifies the volatility of GDP growth.⁶⁷ Regarding the second dynamic, Sadeghi (2017) reports results suggesting that:

government size is important in explaining the transmission of oil price shocks to oil-exporting economies. Government expenditure and non-oil output increase, in response to an unexpected increase in oil prices, and the increase is larger, the larger is the government. Furthermore, oil price volatilities explain a greater portion of volatility in non-oil output when government is large.⁶⁸

Intuitively, an economy dominated by commodity exports experiences more growth volatility than a more diversified one, simply because it is less likely that many different industries slump simultaneously than it is that commodity prices drop. Sadeghi's results are interesting because they demonstrate that commodity price volatility also propagates through non-extractive industries, to an extent determined by the size of the public sector. If this is true, then reducing the size of the public sector and diversifying the economy are both good ways

surplus. It is to increase exports to enable incremental productive employment, larger imports, and ultimately faster growth.").

⁶³ See Claudio Bravo-Ortega and Jose de Gregorio, *The Relative Richness of the Poor: Natural Resources, Human Capital and Economic Growth*, World Bank Policy Research Working Paper WPS3484 (2005); Marcus Kurtz and Sarah M. Brooks, *Conditioning the 'Resource Curse': Globalization, Human Capital and Growth in Oil-Rich Nations*, 44 COMP POL STUD 747, 757 (2011) (presenting evidence that "the growth effects of natural resource wealth are contingent and largely based on endowments of human capital").

⁶⁴ Antonio Ciccone and Elias Papaioannou, *Human Capital, the Structure of Production, and Growth*, 91 REV ECON STATS 66, 67, 70 and 80 (2009) (analyzing a sample of 66 countries from 1980–95, measuring "country-level human capital [as] average years of schooling of the population").

⁶⁵ Id. at 70.

⁶⁶ See Markus Brückner and Mark Gradstein, *Exogenous volatility and the size of government in developing countries*, 105 J DEV ECON 254 (2013).

⁶⁷ Amir Sadeghi, *Oil Price Shocks and Economic Growth in Oil-Exporting Countries: Does the Size of Government Matter?*, IMF Working Paper WP/17/287 (2017).

⁶⁸ Id. at 14.

to stabilize GDP growth.

In sum, the divergent interests of citizens and governments make it difficult for them to commit to behaviors that benefit the other party. Economically inefficient political dynamics—often exacerbated by natural resource wealth—arise in response to this commitment problem, causing underinvestment in health and education. Underinvestment in human capital is detrimental to both citizens and bondholders because it decreases the rate, duration and stability of economic growth. Before turning to the design of an HDB that could combat these dynamics, it is worth acknowledging the recent groundswell of enthusiasm for a related state-contingent debt instrument: GDP-linked bonds.⁶⁹

B. GDP-linked bonds have the potential to stabilize debt-to-GDP ratios and help issuers avoid pro-cyclical fiscal policies.

State-contingent debt securities that index a sovereign issuer's payment obligations to an indicator of its ability to repay have captured scholarly imagination since the Latin American debt crisis of the 1980s.⁷⁰ In practice, so-called "value recovery instruments," linking payments to GDP levels, export revenues or commodity prices, played a minor role as deal sweeteners in the Brady restructurings of the early 1990s.⁷¹ These instruments mimic the role of "equity kickers" commonly offered to creditors in corporate restructurings; the idea is that creditors are more likely participate in a restructuring—that is, to consent to a reduction in the net present value of their claims—if they are given "a chance of recouping a portion of [that] loss" as the issuer's economic prospects improve.⁷² More recent sovereign exchange offers (by Argentina (2005 and 2010), Greece (2012), Ukraine (2015) and Grenada (2015)) have sought to induce private creditor participation by attaching GDP warrants to new bonds issued in the exchange.⁷³ These warrants, like the original value recovery instruments, were

⁶⁹ See, for example, Gary Kleiman, *The Case for GDP Growth Bonds*, Financial Times (January 30, 2018), available online at <https://www.ft.com/content/d340171a-05b2-11e8-9650-9c0ad2d7c5b5>. See also notes 89–90, *infra*, and accompanying text.

⁷⁰ See, for example, Paul Krugman, *Financing vs. Forgiving a Debt Overhang*, 29 J DEV ECON 253 (1988); Kenneth A. Froot, David S. Scharfstein & Jeremy C. Stein, *LDC Debt: Forgiveness, Indexation, and Investment Incentives*, 44 J FINANCE 1335 (1989); Robert J. Shiller, *National Income and Labor Income Markets*, in MACRO MARKETS: CREATING INSTITUTIONS FOR MANAGING SOCIETY'S LARGEST ECONOMIC RISKS (Oxford, 1998). See also Marcos Chamon and Paulo Mauro, *Pricing Growth-Indexed Bonds*, IMF Working Paper 05/216, 9 (2005) (collecting sources).

⁷¹ See Lee C. Buchheit, *No Easy Route to Recovering Value*, 10 INT'L FIN L REV 7 (1991) (detailing the challenges and legal terms associated with value recovery instruments issued by Mexico, Costa Rica, Venezuela and Uruguay); *State-Contingent Debt Instruments for Sovereigns*, IMF Policy Paper, 20 (2017). For a comprehensive discussion of the Brady Plan (named for U.S. Treasury Secretary Nicholas Brady) that converted the syndicated loan obligations of several LMI countries into bonds collateralized by U.S. Treasury securities, see John Clark, *Debt Reduction and Market Reentry under the Brady Plan*, FRBNY Quarterly Review (Winter 1993–94).

⁷² Buchheit, *No Easy Route to Recovering Value* at 7 (cited in note 71).

⁷³ See Stephen Kim Park and Tim Samples, *Towards Sovereign Equity*, 21 STANFORD J L BUS & FIN 240, 267–72 (2016); *State-Contingent Debt Instruments for Sovereigns* at 22 (cited in note 71); Bank of England, *Sovereign GDP-linked bonds*, Financial Stability Paper No. 39, 14 (2016).

largely ineffective, either because they failed to induce much creditor participation⁷⁴ or they ended up costing the recovering issuer a lot⁷⁵—or both.⁷⁶

Though a stand alone GDP-linked bond has yet to grace international capital markets, a growing body of economic and legal scholarship articulates the benefits of GDP-indexing: By tying the issuer's debt obligations to a timely proxy of its ability to service them, GDP-linked bonds can help the issuer avoid pro-cyclical fiscal policy and stabilize its debt-to-GDP ratio, potentially reducing its risk of default and (as a result) its fixed-rate borrowing costs as well.⁷⁷ For investors, GDP-linked bonds offer a broader, equity-like claim on national income than do corporate equities, especially in countries with less developed capital markets.⁷⁸ When linked to nominal GDP, they also provide a broader hedge against changing living standards than do inflation-linked bonds. The latter offer a fixed real return, whereas nominal GDP-linked bonds protect against both price changes (absolute purchasing power) and productivity changes (relative purchasing power) over time.⁷⁹ Of course, investors could achieve nearly the same result by buying a combination of inflation-linked bonds and corporate equities, but a GDP-linked bond would increase the standardization and tradability of that position by consolidating it into a single security.⁸⁰

These benefits cannot be realized unless enough investors are willing to purchase the instrument at a price acceptable to the sovereign issuer. Because the investor bears the risk that GDP will be lower than expected, GDP-linked bond yields must exceed the risk-free rate by enough to compensate the investor for the undiversifiable, or systematic, portion of that risk. This "GDP risk premium" is likely to be smaller for emerging market economies than advanced economies, because comovements between the GDP of emerging market economies and global GDP tend to be weaker than those between advanced economies and

⁷⁴ See Lee Buchheit and Elena L. Daly, *Minimizing Holdout Creditors: Carrots*, in SOVEREIGN DEBT MANAGEMENT, eds. Rosa M. Lastra and Lee Buchheit, 11 (Oxford: 2014) ("Value recovery rights [(VRRs)] have had a chequered career in sovereign debt restructurings. They are typically designed to be well 'out of the money' ... [so] [t]he sovereign debtor consequently gets little or no credit, in the sense of more favourable restructuring terms, when the VRRs are included in a debt restructuring package.").

⁷⁵ Venezuela and Bosnia made ongoing payments on value recovery instruments issued in 1990 and 1997, respectively, whereas Mexico and Bulgaria were able to buy back their warrants before having to make payments on them. See *State-Contingent Debt Instruments for Sovereigns* at 20 (cited in note 71).

⁷⁶ See Park and Samples, *Towards Sovereign Equity* at 268–69 (cited in note 73) ("Unfortunately for Argentina—but fortuitously for holders of the Argentine GDP-linked warrants—the instruments were not accurately priced at issuance. ... Argentina's rebounding economy [subsequently] led to billions in payments on the warrants Argentina's GDP-linked experiment has been an expensive one in light of the minimal value of the warrants during restructuring.").

⁷⁷ See Eduardo Borensztein and Paulo Mauro, *The case for GDP-indexed bonds*, IMF Economic Policy, 168–69 and 177–83 (2004); *State-Contingent Debt Instruments for Sovereigns* at 6–7 and 10–11 (cited in note 71).

⁷⁸ See Bank of England, *Sovereign GDB-linked bonds* at 11 (cited in note 73).

⁷⁹ See id; *State-Contingent Debt Instruments for Sovereigns* at 10 (cited in note 71) ("[N]ominal GDP-linked bonds may be appealing to savers that seek to preserve both *absolute* and *relative* purchasing power. The inflation component of these bonds preserves savers' absolute purchasing power; while the real-GDP component ensures that they receive a return similar to that of the 'average' earner.").

⁸⁰ See *State-Contingent Debt Instruments for Sovereigns* at 10 (cited in note 71) ("[A]nnuity payments by pension funds in some countries (like Uruguay) are explicitly tied to average earnings movements, creating a natural demand for assets linked to earnings.").

global GDP.⁸¹ For any given GDP-linked bond issuer, the size of the GDP risk premium it will have to pay decreases as: (i) the correlation between its GDP and investors' liabilities approaches one; and (ii) the correlation between its GDP and the returns on investors' other assets approaches negative one. The more these two conditions are satisfied, the greater is the scope for diversification, and the lower is the premium for the insurance component of the GDP-linked bond. Whatever the size of the GDP risk premium demanded by the market, sovereign issuers' willingness to pay it will be larger to the extent they are more risk averse than investors and to the extent their expectations regarding their own GDP growth are more pessimistic (resulting in lower payouts on the instrument) than those of investors.⁸²

In addition to the GDP risk premium, a number of other factors would likely further push up the market-clearing yield on a GDP-linked bond. For instance, a "liquidity premium" would be required to compensate investors for the limited secondary market for GDP-linked bonds as they are initially introduced. A "novelty premium" would be required to compensate investors for the unfamiliarity of the instrument and the additional research costs of modeling its potential returns in order to price it. The novelty premium increases with the complexity of the payout formula, the number of state variables it incorporates and the difficulty of obtaining reliable information about the evolution of those variables over time.⁸³ Evidence from the launch of inflation-linked bonds—beginning with issuances by the United Kingdom in 1981 and Australia in 1985—suggests that novelty and liquidity premia tend to diminish over time as the market scales up, but may never disappear entirely.⁸⁴

Regarding payout formulae, three benchmark designs have been discussed: "linkers," "floaters" and "extendibles."⁸⁵ These categories are distinguished by the nature of the contingency between the security's payment schedule and the underlying state variable. Whereas linkers let the principal vary with the level of the state variable and calculate coupons as a fixed percentage of that contingent principal amount, floaters maintain a fixed principal but offer a coupon that varies with the growth rate of the state variable. In contrast, extendible designs typically elongate the bond's tenor if a pre-defined trigger is breached (*e.g.*, natural disasters or adverse commodity price movements). Figure 8 tabulates these and other salient differences between these three benchmark designs.

Focus on the first two designs. A linker, for example, might offer an annual coupon according to the following formula:

$$c_t = r \left(\frac{G_t}{G} \right) (\text{principal}) \quad (1)$$

⁸¹ Bank of England, *Sovereign GDB-linked bonds* at 12–13 (cited in note 73). This qualitative comparison also holds true if—instead of global GDP—world real stock returns, U.S. real stock returns or U.S. GDP is used to proxy the return on the 'market portfolio' for purposes of estimating a Capital Asset Pricing Model. See Borenzstein and Mauro, *The case for GDP-indexed bonds* at 183–86 (cited in note 77).

⁸² See *State-Contingent Debt Instruments for Sovereigns* at 11–12 (cited in note 71).

⁸³ See *id.* at 12–13; Bank of England, *Sovereign GDB-linked bonds* at 13 (cited in note 73).

⁸⁴ See Pu Shen, *Developing a Liquid Market for Inflation-Indexed Government Securities: Lessons from Earlier Experiences*, FEDERAL RESERVE BANK OF KANSAS CITY ECONOMIC REVIEW 89, 91 and 103 (First Quarter 2009) ("Market liquidity also appeared to have improved somewhat [since the initial launch of U.S. Treasury Inflation Protected Securities (TIPS) in 1997]. Looking forward, liquidity premium will likely remain a component of the yields of TIPS."); *State-Contingent Debt Instruments for Sovereigns* at 19 (cited in note 71).

⁸⁵ *State-Contingent Debt Instruments for Sovereigns* at 30–36 (cited in note 71).

where c_t is the size of the coupon owed at the end of year t , r is the yield set by the market (incorporating the risk-free rate as well as premia for default risk, GDP risk, novelty and liquidity), $\bar{G}$ is GDP on the issue date (or, alternatively, expected GDP for year t) and G_t is actual GDP for the year.⁸⁶ Additionally, like an inflation-linked bond, the principal payable on redemption is adjusted to reflect changes in GDP over the life of the instrument. However, unlike inflation-linked bonds, which typically include a "deflation floor" (so that the principal can only be adjusted upward)⁸⁷, GDP-linked bonds allow the principal to adjust downward if growth has stagnated. Indeed, downward principal adjustment is the main stabilizing influence on the issuer's debt-to-GDP ratio. Investors may nonetheless insist on a principal floor, comparable to inflation-linked bonds.

A floater design, on the other hand, might offer annual coupons according to the following formula:

$$c_t = (\max\{r + (g_t - \bar{g}), 0\})(\text{principal}) \quad (2)$$

where g_t is GDP growth for year t , $\bar{g}$ is expected GDP growth and the other variables are defined as before. This formula, contemplated by Borensztein and Mauro (2004), includes a floor at zero, to avoid the hassle of negative coupon payments in the event that actual growth falls drastically short of expected growth. The primary benefit achieved by linking coupons to growth rates is debt service relief during recessions, which may help avoid fiscal austerity measures with deleterious effects on welfare and economic growth. If the principal is not also linked to GDP (levels or growth rates) in some way, the stability of the debt ratio is not much improved by the floater design.

These benchmark designs are but stand-ins for a nearly infinite variety of possible payout formulae. In theory, any or all of the principal, coupon and maturity of a state-contingent debt instrument can be indexed to a growth rate, level, moving average, variance or any other summary statistic conveying information about any observable state variable. In real-world markets, though, simplicity is paramount. Investors are wary of instruments too dissimilar from existing products, and of payout formulae implying an unduly complex or ill-defined distribution of possible returns.⁸⁸ Moreover, reliable protocols for measuring the state variable must be plainly specified in the bond's offering documents. GDP is a good state variable partially because its measurement has been standardized internationally and data collection is overseen by the IMF and the World Bank, reducing the likelihood of fraudulent manipulation. Even so, the measurement lag—between when goods and services are produced, when they show up in national income accounts, and then when payments based on those accounts are actually disbursed to bondholders—creates a chance that debt relief

⁸⁶ This design is adapted from *The London Term Sheet* promulgated by the Bank of England's Ad Hoc Working Group on GDP-Linked Bonds. See *Indicative Term Sheet – GDP Bonds*, available online at <https://www.icmagroup.org/resources/Sovereign-Debt-Information/>.

⁸⁷ *Inflation-Linked Bonds*, PIMCO, available online at <https://global.pimco.com/en-gbl/resources/education/understanding-inflation-linked-bonds>.

⁸⁸ See Mark Joy, *Sovereign GDP-Linked Bonds: Design, Investor Response and Open Issues*, Bank of England Ad Hoc Working Group on GDP-Linked Bonds, 1 (2017), available online at <https://www.icmagroup.org/resources/Sovereign-Debt-Information/> ("[T]he GDP-linked bond outlined in *The London Term Sheet* has been designed with the following principles in mind: (i) *simplicity*, avoiding the multiplicity of conditional payment triggers that caused Argentina's GDP warrants to trade out of the money for long periods and inhibited fair-value pricing; [and] (ii) *familiarity*, taking many of the industry-standard terms present in inflation-linked bond contracts and adapting them.").

will be poorly timed.⁸⁹ Well-timed debt relief transfers the risk of recession from poor families to yield-seeking investors better equipped to bear it, but debt relief during a boom could counterproductively facilitate government profligacy; the possibility of increased debt obligations during a recession is even more worrisome.

Such challenges are an area of ongoing research. In addition to the IMF and the United Nations Department of Economic and Social Affairs, central banks in Europe and Canada have published research on the challenges facing would-be GDP-linked bond issuers.⁹⁰ The Bank of England's Ad Hoc Working Group on GDP-Linked Bonds has consolidated academic research, legal experience and investor feedback to create *The London Term Sheet*, a template exemplifying the legal features of such an instrument.⁹¹ Yet as the international community continues to work towards a GDP-linked bond issuance, the possibility of tying debt obligations to other indices remains relatively underexplored.⁹²

II. Human Development Bond Design

Standard GDP-linked instruments facilitate international risk sharing, but they have two unwelcome implications. First, because improved economic growth increases bondholders' claims on the nation's earnings, GDP-linked bond issuers have less incentive to spur growth than they would if the entire benefit of it were enjoyed by them and their citizens. Second, the vast majority of citizens may not benefit at all from a GDP-linked bond issuance, especially if the issuing government does not take advantage of the more forgiving fiscal space to promote inclusive growth (as opposed to expanding the public sector or offering tax breaks to extractive industries). An HDB addresses both of these shortcomings by providing partial debt relief in boom times, provided the boom is attended by population-wide improvements in health and education.

To effectuate this inclusive growth incentive without sacrificing the recession insurance provided by standard GDP-linked instruments, the HDB's payout formula must be asymmetric in the way it incorporates human development data. That is, when growth is

⁸⁹ See Bank of England, *Sovereign GDB-linked bonds* at 16–17 (cited in note 73) ("For Argentina's warrants, which are still trading, there is a lag of 350 days between the reference date when the payment is calculated and the effective date of payment. A lag of this length reduces the warrant's countercyclical properties. In 2009, against the backdrop of an international financial crisis, Argentina made relatively large payments.").

⁹⁰ See, for example, Stephany Griffith-Jones and Krishnan Sharma, *GDP-Indexed Bonds: Making It Happen*, UNDESA Working Paper No. 21 (2006); Martin Brooke, Rhys Mendes, Alex Pienkowski and Eric Santor, *Sovereign Default and State-Contingent Debt*, Bank of Canada Discussion Paper 2013-3 (2013); Bruno Cabrillac, Ludovic Gauvin and Jean-Baptiste Gossé, *GDP-indexed bonds*, 44 *Banque de France Bulletin* 5 (2017).

⁹¹ See *Indicative Term Sheet – GDP Bonds*, available online at <https://www.icmagroup.org/resources/Sovereign-Debt-Information/>. See also Yannis Manuelides, *GDP-linked bonds: a commentary on a term sheet*, 12 *CAP MKTS L J* 125 (2017).

⁹² But see, for example, Rintaro Yamaguchi and Shunsuke Managi, *New Financing for Sustainable Development: The Case for NNP- or Inclusive Wealth-Linked Bonds*, 26 *J ENVIRONMENT AND DEV* 214 (2017). See also Eric Posner, *Human Welfare, Not Human Rights*, 108 *COLUMBIA L REV* 1758, 1798 (envisioning "a welfarist treaty ... drafted to oblige developed states both to pressure states that fail to deliver adequate welfare to their populations and to provide aid to states that show progress"); *Green, Social and Sustainability Bonds*, International Capital Market Association, available online at <https://www.icmagroup.org/green-social-and-sustainability-bonds/>.

lower than expected, bondholders' claims decrease, regardless of changes in human capital; when growth is higher than expected, bondholders' claims increase in a way determined by improvements in human capital. If human capital improves a lot, bondholders' claims should increase less than they do when human capital deteriorates (or only improves a little).

With these objectives in mind, consider the following HDB coupon formula.

$$c_t = r(1 + (g_t - \bar{g}) - \alpha h_t)(\text{principal}) \quad (3)$$

where

$$\alpha(g) = \begin{cases} 0, & \text{if } g_t \leq \bar{g} \\ kg_t, & \text{if } g_t > \bar{g} \end{cases}$$

and h_t represents changes in human capital over the interval t , measured as the growth rate of a geometrically-weighted average of the health and education components of the Human Development Index. α is a function of the GDP growth rate, such that when growth is less than expected, changes in human capital have no effect on coupon payments; when growth is higher than expected, improvements (depreciations) in human capital reduce (increase) coupon payments by an amount determined by k , a constant weighting factor. The larger k is, the more incentive the issuer has to improve human capital. In practice, k would be determined by the market—in negotiations between the issuer's counsel and the underwriters' counsel, hopefully with the support of the UN and the IMF—with underwriters' willingness to accept a larger k determined by the extent to which investors believe that human capital improvements will translate into higher (or less volatile) growth within the life of the bond.

For example, imagine a developing nation that manages to issue an HDB at 7% ($r = 0.07$). If k is 20, growth in year t happens to be 5% (which exceeds expectations by 3%) and human capital improves by 2%, then the issuer will owe a coupon of 7.07%, rather than the 7.21% it would owe under these growth conditions if human capital remained unchanged. On a principal of \$1 billion, this corresponds to a \$1.4 million reduction in debt service obligations. If either k or growth were higher, the reduction would be correspondingly larger. (Figure 9 presents some stylized examples to further illustrate the relationships embodied in coupon formula (3).)

In other words, the higher growth is, the more incentive the issuer has to improve human capital. Moreover, human capital depreciations only increase debt obligations when growth is higher than expected, which helps reduce the risk of exacerbating the vicious cycle in which diminished human capital increases indebtedness and indebtedness diminishes human capital. Thus, a coupon formula like (3), when properly calibrated, has the potential to combine the countercyclical debt relief of GDP-indexing with a financial incentive for the issuer to promote inclusive economic growth driven by improvements in health and education.

Calibrating it to provide well-timed and appropriately sized relief in response to real-world data, however, is a major (if not impossible) challenge. Two sets of calibration issues are particularly intractable. First, measurement lag. Until 2010, data on the health and education components of the Human Development Index are only available at five year intervals (beginning in 1990). No human development data are yet publicly available for 2016, 2017 or 2018.⁹³ This limited availability speaks to the tremendously time consuming data collection and processing effort undertaken by the UN Human Development Report Office

⁹³ See Human Development Data (1990-2015), available online at <http://hdr.undp.org/en/data>.

and its collaborators. The UNESCO Institute for Statistics (which supplies most of the data for the education component) and the World Health Organization (which supplies the data for the health component) are both working to improve and standardize data collection processes at the national level, but it may be years before human development data are published with the timeliness and regularity of GDP data.⁹⁴ Lags magnify the risk that coupon payments will be ill-timed, while the sparse historical time series of human development data makes it difficult for investors to model the distribution of possible coupon rates. As a result, the novelty premium on an HDB would be high.

The second intractable issue stems from the observation that, to achieve its political economy and development aims, an HDB should be long in tenor and costly to buy back. When growth is stronger than expected, issuers may have an incentive to buy back, or offer new instruments in exchange for, their outstanding HDBs, rather than paying coupons on them. But if it buys back or swaps out its HDBs, the issuer is off the hook, and neither citizens nor creditors benefit from the kind of growth the HDB is meant to encourage. The tendency of this buyback incentive to dominate the human development incentive depends on the parameters of the coupon formula. Mainly, insofar as growth expectations ($\bar{g}$) underestimate actual growth, and as the weighting factor (k) goes down, retiring debt obligations through buybacks or exchange offers becomes more attractive, relative to reducing them through investments in human capital. Problematically, though, as the tenor of the bond increases, investors become less willing to endorse a coupon formula with high values of $\bar{g}$ and k . All else equal, uncertainty about the future trajectories of GDP and human development inclines investors towards lower values of $\bar{g}$ and k (because lower values tend to result in higher coupons). The resulting dilemma is that when the HDB's tenor is long enough to provide meaningful recession insurance and inclusive growth incentives, the only values of $\bar{g}$ and k that investors are willing to agree to (at a price acceptable to the issuer) may be so low that any economic growth spurt renders buybacks preferable to coupon payments (from the issuer's perspective).⁹⁵

One possibility would be to prohibit, by means of formal representations in the offering documents, buybacks and exchanges of HDBs. The problem with this approach is not just that it limits the issuer's liability management options, it also raises the costs of poorly specifying parameters $\bar{g}$ and k at issuance. An alternative possibility would be to update $\bar{g}$ for each coupon period. Underwriters and issuer could agree at the outset that, at each coupon payment date, growth expectations for the subsequent coupon period are set in accordance with a deterministic forecast formula or by appeal to the official forecasts of an independent

⁹⁴ See generally *The Quality Factor: Strengthening National Data to Monitor Sustainable Development Goal 4*, UNESCO Institute for Statistics (2017), available online at <http://uis.unesco.org/sites/default/files/documents/quality-factor-strengthening-national-data-2017-en.pdf>; *World Health Statistics 2017: Monitoring Health for the SDGs*, World Health Organization, available online at http://www.who.int/gho/publications/world_health_statistics/2017/en/.

⁹⁵ Widespread buybacks of Brady bonds illustrate this dynamic. "Brady bonds ... were tailor-made in all sizes, and carried a wide variety of covenants, conditions, warrants, and other complex features, such as collateral. ... However, as countries gained more access to capital markets and world interest rates fell, Brady bonds became relatively expensive. ... This prompted countries to reduce or eliminate their holdings of such bonds through buyback or swap operations, and outstanding Brady bond holdings declined from US\$154 billion in 1994 to US\$10.7 billion at mid-December 2006." Carlos Medeiros, Magdalena Polan and Parmeshwar Ramlogan, *A Primer on Sovereign Debt Buybacks and Swaps*, IMF Working Paper WP/07/58, 3 and n. 2 (2007).

authority like the IMF. While this approach would mitigate the risk that actual GDP trajectories diverge wildly from expectations⁹⁶, it still fails to ensure that the absolute magnitude of changes in coupon payments will suffice to effectuate the recession insurance and inclusive growth incentives the HDB is meant to achieve.

Further empirical research, beyond the scope of this Essay, is needed to investigate the feasibility of calibrating the instrument to generate appropriately sized, well-timed debt relief without resorting to an unduly complex and difficult-to-price coupon formula.⁹⁷ Such feasibility studies, however, are only warranted insofar as there is at least a potential market for the HDB. Putting aside the very real challenges of measurement and calibration, the next Part contemplates that potential market by asking whether an ideal HDB (*i.e.*, one that achieves both recession insurance and inclusive growth incentives) would be worthwhile to self-interested issuers and investors.

III. Evaluating the Credibility and Value of a Human Development Bond

Because governments care about popular support from their citizens and the financial terms on which they can borrow on international capital markets, they have reason to commit to policies that benefit their citizens and creditors. With limited means to enforce those commitments, however, citizens and creditors are not swayed by purported commitments to policies that are not also in the interests of the government itself (or the individual officials it comprises). Before evaluating how citizens and creditors would perceive the value and credibility of the commitment to human development embodied in the HDB, this Part introduces a standard agency cost framework that guides the ensuing discussion.

A. An agency cost framework provides key concepts useful for evaluating contract design proposals.

Principal-agent models, prevalent in scholarship on contract design and corporate governance since the 1970s, conceive the agency relationship generally "as a contract under which one or more persons (the principal(s)) engage another (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent."⁹⁸ Principals tend to benefit more when the agent exercises her delegated authority in ways that maximize the principals' welfare, but the agent has private incentives to exercise her delegated authority in ways that enrich her at the principals' expense. Moreover, not every nuance of the agent's performance is observable to the principals, and chance mediates the impact of that performance on the principals' outcome. Consequently, principals find it difficult to distinguish, on the basis of observable outcomes alone, whether those outcomes result from the agent's prudent diligence or from sheer luck.⁹⁹

⁹⁶ See note 76, *supra*, and accompanying text (discussing Argentina's travails with GDP warrants).

⁹⁷ This research could also consider the possibility that indexing the bond's principal or maturity might resolve some of these calibration challenges; it could also consider alternative state variables.

⁹⁸ Jensen and Meckling, *Theory of the Firm* at 308 (cited in note 24).

⁹⁹ See Eric Posner, *Agency Models in Law and Economics*, JOHN M. OLIN LAW & ECONOMICS WORKING PAPER NO. 92 (2000), available online at <https://ssrn.com/abstract=204872>. The agency cost framework sketched in this Section follows Posner's treatment except where otherwise noted.

Consider two motivating examples from the corporate context, adapted from Jensen and Meckling (1976).

Example 1: Expropriating Perks. The manager of a company is the agent of its shareholders. The shareholders delegate decision-making authority to the manager, instructing her to wield that authority to maximize the value of the enterprise. Yet even if she undertakes to maximize the value of the company with the utmost prudent diligence, the market may tank, leaving shareholders worse off. Similarly, even if she expropriates some non-pecuniary perquisites for herself that reduce the enterprise's value, the market may surge, leaving shareholders giddy with capital gains. If shareholders only observe the company's stock price, how should they structure the manager's compensation scheme to induce value-maximizing decisions?

Example 2: Substituting Assets. The manager is also the agent of the company's creditors, who have delegated to her the authority to invest their money in ways that protect the value of their claims against the company. To the extent the manager is also an equity holder (with a residual claim on earnings), though, she has reason to exploit that authority by investing in riskier assets than necessary to repay the debt. If a risky asset does well, she and other equity holders capture the portion of its returns that exceeds the debt obligations; if not, the creditors bear most of the loss. Yet even prudent investments sometimes fail. If creditors cannot observe the agent's investment decisions directly, they will have difficulty distinguishing unlucky defaults from those due to excessive risk-taking. How should they structure the debt contract to induce the agent to invest in ways that protect their claims?

An optimal contract, designed to align the interests of the agent and with those of the principals at the lowest cost, would compensate her only for diligence (not for luck). In practice, however, the unobservable aspects of the agent's performance create a trade off between incentivizing versus insuring the agent.¹⁰⁰ A "*flat-rate contract*,"¹⁰¹ for example—under which the agent's remuneration does not vary with the outcome of her performance—insures the agent against the risk that outcomes do not reflect her effort, but it fails to incentivize diligence, because the agent will be paid the same amount no matter how hard she works to advance the principals' aims.¹⁰² Foreseeing that the agent has no incentive to be diligent, principals will offer a rate commensurate with low-diligence work, and the agent will work less diligently than she would under an optimal contract. Even if the cost of incentivizing

¹⁰⁰ See Bolton and Dewatripont, *CONTRACT THEORY* at 23 (cited in note 43) ("[A]n efficient *trade-off* between insurance and incentives involves rewarding the employee most for output outcomes that are most likely to arise when she puts in the required level of effort and punishing her the most for outcomes that are most likely to occur when she shirks."). This trade off, and the ensuing discussion in the text, is premised on the agent's risk aversion. If the agent is risk neutral and not wealth constrained, there is no trade off because the optimal effort level can be obtained (even if effort is not observable) by letting her keep all the fruits of her labor on the condition that she pay an upfront fee to the principal. This turns the agent into a residual claimant on her own work product (incentivizing her to work hard enough to recoup the upfront fee), and she bears all the risk that her effort does not translate into a profitable outcome.

¹⁰¹ Posner, *Agency Models* at 3 (cited in note 99).

¹⁰² This is like shareholders paying the manager a fixed salary, or creditors extending a loan with no penalty for default.

further effort by the agent is less than the marginal benefit of that effort to the principals (such that they would like to pay her more for more effort), the overly simplistic design of the contract prevents them from offering her those socially welfare-improving incentives. As a result, principals and agent are both worse off than they would be under an optimal contract.

On the other side of the incentive-insurance trade off is a contract that remunerates the agent based on the outcome of her performance: good outcome, high pay; bad outcome, low pay.¹⁰³ This "*high-power incentive contract*,"¹⁰⁴ aligns the objectives of the agent and with those of the principals, but it causes the agent to bear all the risk that observed outcomes do not reflect her effort. What if she exerts all possible prudent diligence but an unfortunate outcome occurs anyway? This possibility makes the contract less valuable to her than a remuneration schedule keyed to effort rather than outcomes. Alternatively, if she is compensated for bearing this risk, the cost to the principals will be higher than if they could observe her effort directly.¹⁰⁵ In either case, social gains are less than they would be under an optimal contract.

The agency costs of a contract are measured by the extent to which the social gains it creates fall short of the social gains that would be created by a theoretically optimal contract. Under the flat-rate contract, that shortfall appears as a socially suboptimal supply of effort by the agent (undersupply). Under the high-power incentive contract, the agent supplies the socially optimal amount of effort, but it costs more than it would under an optimal contract (overpricing). Even a "*mixed contract*"¹⁰⁶—combining incentives and insurance—is unlikely to completely eliminate undersupply or overpricing, because the agent's contribution to the principals' outcome remains prohibitively costly (if not impossible) to assess with certainty. A second-best contract is one that minimizes agency costs, and it will often be some form of mixed contract.¹⁰⁷

Under certain circumstances, agency costs can be reduced by a credible commitment from the agent to maximize the principals' welfare. This will be the case when the cost of enforcing the commitment (itself a form of agency cost) is less than the cost of the undersupply or overpricing it avoids. Because they each stand to benefit from the increased surplus, both agent and principals have reason to facilitate such credible commitments by incurring bonding and monitoring costs, respectively.¹⁰⁸

Suppose, for instance, that the manager promises not to expropriate perks or make excessively risky investments. These promises are not credible unless (i) the principals know

¹⁰³ This is like compensating the CEO with nothing but stock in the company, or extending a loan with draconian default penalties.

¹⁰⁴ Posner, *Agency Models* at 3 (cited in note 99).

¹⁰⁵ Even if the agent is risk-neutral (such that the issue of compensating her for risk-bearing does not arise), her remuneration for a good outcome must be higher than it would be under an optimal contract because she will discount that remuneration by the conditional probability of a bad outcome given high effort. See *id.* for a numerical example.

¹⁰⁶ *Id.*

¹⁰⁷ A mixed contract might, for example, pay the CEO with both stock options and a salary, or penalize default only if it is not remedied within a reasonable time.

¹⁰⁸ See Jensen and Meckling, *Theory of the Firm* at 308 (cited in note 24) ("The principal can limit divergences from his interest by establishing appropriate incentives for the agent and by incurring monitoring costs designed to limit the aberrant activities of the agent. In addition in some situations it will pay the agent to expend resources (bonding costs) to guarantee that he will not take certain actions which would harm the principal or to ensure that the principal will be compensated if he does take such actions."); Posner, *Agency Models* at 5 (cited in note 99).

when the promise has been broken, and (ii) the penalty for breaking it outweighs the benefit of doing so. Monitoring the agent helps the principals know when the penalty should apply. Bonding the agent (to incur the penalty whenever the promise is broken) helps ensure that the penalty will be an effective deterrent. In the corporate context, monitoring and bonding practices include "auditing, formal control systems, budget restrictions," debt covenants that "impose constraints on management's decisions regarding such things as dividends, future debt issues, and maintenance of working capital," and any expenditures by management necessary to comply with these constraints (or remedy noncompliance).¹⁰⁹ By providing reliable information about otherwise unobservable aspects of her performance, and agreeing to incur harsh penalties when that information is adverse to the principals' interests, an agent can signal the credibility of her commitment to maximizing principals' welfare.¹¹⁰

B. A Human Development Bond signals a sovereign borrower's commitment to the welfare of its citizenry.

With this agency cost framework in mind, consider a government as the agent of its citizenry.¹¹¹ Citizens delegate to the government the authority to, among other things, manage the country's resources so as to maximize social welfare. Even in the most robust democracies, however, civilian oversight of government decision making is not perfect, and government officials' private interests often diverge from that of the public. As discussed in Part I.A (above), this divergence is particularly acute in resource rich countries with weak institutions of governance. There, natural resource rents (in the form of a state-owned oil company's profits, concession fees from a foreign mining company or tax revenues from commodity exporters, say) give governments strong incentives to expropriate public wealth for themselves and to engage in politically motivated, rather than economically efficient, public spending in order to stay in office. And weak governance institutions give them little reason not to. In this setting, some but not all features of the relationship between citizens and government are approximated by the relationship between the shareholders and management of a firm.

The "agency costs of outside equity" refer to the discrepancy between the value of a firm wholly owned by its manager and the value of that firm if it is owned partially by the manager and partially by other shareholders.¹¹² In Jensen and Meckling's model, the manager must choose how many non-pecuniary perks to expropriate for herself out of the firm's earnings. If she owns the whole firm, she bears the full cost of the reduction in earnings caused by each expropriated perk. If she only owns a fraction (α) of the firm, then each dollar's worth of perks expropriated reduces her earnings by \$ α . Because she gets the full benefit of the perks but other shareholders bear a fraction $(1 - \alpha)$ of their cost, she will expropriate more than she would if she were the sole owner. Foreseeing this tendency,

¹⁰⁹ Jensen and Meckling, *Theory of the Firm* at 323 and 338 (cited in note 24).

¹¹⁰ See Bengt Holmstrom, *Moral Hazard and Observability*, 10 BELL J ECON 74, 87 (presenting a formal proof that "any informative signal, regardless of how noisy it is, will have positive value (if costlessly obtained and administered into the contract)").

¹¹¹ Many authors have developed this theme. See, for example, Gary J. Miller, *The Political Evolution of Principal-Agent Models*, 8 ANNUAL REV POL SCI 203 (2005); Gersbach, *Competition of Politicians* (cited in note 34); Nuno Garoupa and Tom Ginsburg, JUDICIAL REPUTATION: A COMPARATIVE THEORY, 3 (Chicago: 2015) ("We treat judges as the agents and society as the ultimate principal").

¹¹² See Jensen and Meckling, *Theory of the Firm* at 312–28 (cited in note 24).

prospective investors will pay less for a share than they would if the manager's incentives were more aligned with theirs. The smaller the share of the firm retained by the manager, the greater the agency costs, and the lower the share price. This dynamic is ameliorated insofar as monitoring and bonding enable the manager to commit ex ante to limit expropriations ex post.¹¹³

Citizens also invest less, in themselves and other assets, when they foresee that returns on that investment will not accrue entirely to them, but will be expropriated by the government. Even if taxes are low and private property rights respected, government effectively expropriates citizens' potential earnings by managing the fisc and the economy in ways that discourage private investment in education.¹¹⁴ Where democratic accountability is weak, government does not bear the full cost of policies that stifle long term growth. In a loose sense, the analog of α in this context is the probability that the government stays in power; the lower that probability, the more incentive government has to expropriate what it can now, and the less incentive citizens have to invest. Like the outside shareholders in Jensen and Meckling's model, citizens of these countries would be willing to invest more, and to reward the government with their support, if it could commit to managing the economy for their benefit, rather than its own.

Unlike shareholders contracting with management, though, citizens do not have many options when "contracting" with their governments. Especially when the press and electoral systems are but mechanisms of autocratic control, the terms of the social "contract" are not nuanced; popular revolt may be the only means available to the citizenry to hold the government accountable. In this context, an HDB outsources the monitoring and bonding essential to the credibility of the issuer's commitment to human development. Monitoring is undertaken by the UN system and the Bretton Woods institutions that gather, validate and publish the data informing the HDB's coupon schedule. Bonding is effectuated partially through the legal force of the contracts governing the HDB and partially through extralegal enforcement by markets that impose higher future borrowing costs on issuers that renege.¹¹⁵ The contributions of these international institutions enable an issuing government to promise that it will incur a penalty, in the form of larger coupon payments, if the human capital of its citizens does not improve before the bond matures. As such, the credibility of that promise depends largely on the extent of support from the international community and the willingness of investors to purchase the instrument on a large scale.

As formalized in an HDB, the value to citizens of this promise (were it kept) is straightforward. It is the value of learning and a long life. The main wrinkle is that learning and longevity, as measured by the health and education components of the Human Development Index, do not necessarily translate into higher earnings. Bracketing temporarily the issue of fraudulently manipulated data, even accurate human development data convey information only about the quantity, not quality, of years of life or years of school. But the value of a year of school to the student depends crucially on the quality of the education, the

¹¹³ Id.

¹¹⁴ See Part I.A.ii, *supra*.

¹¹⁵ See Gulati and Triantis, *Contracts Without Law* at 987 (cited in note 25) ("[L]egal enforcement of sovereign debt is much less significant than nonlegal sanctions for default, particularly the threat of damaged reputation and political pressures ... [including] the costs of future borrowing."). For a thorough discussion of the difficulty of enforcing court judgments and arbitral awards against sovereign debtors, see George K. Foster, *Collecting From Sovereigns*, 25 ARIZONA J INT COMP L 666 (2008).

effort she puts into it and the macroeconomic context in which it occurs. In marked contrast to the structural adjustment programs that accompany lending from the Bretton Woods institutions, contracts governing an HDB are ill-suited to stipulate the kinds of education and labor market reforms necessary to transduce additional years of schooling into increased earning capacity. Thus, the value of the HDB to citizens depends on the extent to which the issuing government complements it with a more comprehensive development strategy.

Valuable (or not) as it may be, just how much citizens are willing to reward an HDB issuer with their political support is a question complicated by the work of Robinson and Torvik, surveyed in Part I.A.i (above). They argue that incumbents prefer to procure political support from their constituents in ways that tie voters' "continuation utility" to the continuation of the incumbent's regime.¹¹⁶ If this is so, the political appeal of an HDB issuance may be minimal; formal and informal enforcement of bond obligations decrease the likelihood that a successor government would default on or buy back the HDBs¹¹⁷, so citizens get the inclusive growth benefits of the HDB even if the incumbent loses. Just like an efficient investment project, then, an HDB may be less politically effective than simply hiring voters to work for the public sector. Were this the case, a government may be disinclined to issue an HDB even if citizens perceive it to be a valuable, credible commitment to their welfare.

C. A Human Development Bond signals a sovereign borrower's commitment to stable, enduring growth.

A government is also the agent of its nation's creditors. They have delegated to the sovereign borrower the authority to invest their money in ways that preserve the value of their claims. But, having parted with their funds, dispersed bondholders find it difficult to monitor the government's investment decisions. Again, the governments of resource rich countries often have political incentives to invest in ways that inhibit macroeconomic diversification away from commodity exports. Because commodity prices are volatile, an economy based on exporting resources tends to grow more erratically than a more diversified one. Erratic growth makes tax revenues and future borrowing less reliable means of servicing existing debt obligations, so the sovereign borrower's ability to repay erodes as its economy remains concentrated in commodity exports. This pattern is only worsened by capital-intensive extractive industries (that employ few people) and bloated bureaucracies (that employ many people).¹¹⁸ On the other hand, inclusive growth led by private employers in labor-intensive industries tends to last longer and be less volatile, improving the ability to repay.¹¹⁹ Thus, like those lending to the owner-manager in Jensen and Meckling's second example, the government's creditors would benefit if it could credibly commit to a less volatile growth strategy.

¹¹⁶ See note 42, *supra*, and accompanying text.

¹¹⁷ The public international law doctrine of "state succession" maintains that successor governments automatically inherit the debts of predecessor governments, "regardless of how dissimilar the forms of government may be." Lee C. Buchheit, G. Mitu Gulati and Robert B. Thompson, *The Dilemma of Odious Debts*, 56 DUKE L J 1201 (2007) (discussing the current absence of a workable Doctrine of Odious Debt that would provide an exception to the doctrine of state succession for certain sovereign debts incurred against the interests of citizens).

¹¹⁸ See Part I.A.ii–iii, *supra*.

¹¹⁹ See notes 27–31, *supra*, and accompanying text.

The "agency costs of debt" refer to the reduction in the value of a leveraged firm due to the owner-manager's incentive to invest in assets riskier than those that would maximize the value of the firm.¹²⁰ One way to understand this incentive is to recognize that, as a residual claimant on the firm's earnings, the owner-manager only benefits personally from earnings in excess of the firm's debt obligations and does not bear the full downside costs if a risky bet turns out poorly. Another way to understand it is to recognize that shareholders effectively have a call option on the firm, entitling them to buy it back from the bondholders when bondholders' claims mature at a price equal to the value of those claims. The value of this call option increases with the variance of the distribution of possible earnings. Regardless of how the incentive is conceptualized, potential creditors of the firm foresee that the owner-manager has an incentive to make excessively risky investment decisions, and they discount the amount they are willing to pay for the firm's bonds accordingly. In consequence, the owner-manager's inability to credibly commit to value-maximizing investment decisions increases the firm's cost of capital.

To combat these agency costs, managers often agree to negative covenants in debt contracts, restricting their freedom to make large asset sales and even perhaps limiting their ability to invest the firm's earnings in certain speculative asset classes.¹²¹ Covenant violations constitute an event of default which, if not promptly remedied, triggers a creditor's right to accelerate the debt. Such covenants are valuable to managers precisely because they increase the costs (to the managers) of engaging in asset substitution, thereby reducing the firm's borrowing costs.

Could an HDB play the role of a negative covenant? An HDB imposes costs on the issuer when growth is high but the human capital of its citizens fails to improve. To creditors, that cost represents both a direct and an indirect benefit. The direct benefit accrues in the form of a higher coupon when those conditions obtain; this is like betting against human development, and winning. The indirect benefit to creditors accrues when the threat of higher coupon obligations leads the issuer to encourage human development in ways that increase the stability and expected duration of economic growth. When this occurs, HDB coupons decrease, but creditors' claims become more likely to be repaid and hence more valuable. From this perspective, an HDB is like a standard GDP-linked bond with a negative covenant that penalizes the issuer for decisions that increase earnings volatility.¹²²

Gulati and Triantis (2007) note that while "debt covenants constrain[ing] the freedom of borrowers to engage in activities that are clearly or even possibly inefficient" are commonplace in the corporate context, "similar provisions are absent from sovereign contracts."¹²³ Though a sovereign issuer's "debt-to-GDP ratio, GDP growth rate, inflation rate, the export-to-import ratio or the sovereign's bond rating are widely used as indicators of a sovereign's financial stability, ... they are not adopted in sovereign [debt] contracts to lower default risk."¹²⁴ These authors propose three explanations for this. First, even if covenants

¹²⁰ Jensen and Meckling, *Theory of the Firm* at 333–37 (cited in note 24). Other kinds of agency costs of debt have been noted, such as the underinvestment problem formalized by Stewart C. Myers, 5 J FIN ECON 147 (1977).

¹²¹ See William Bratton, *Bond Covenants and Creditor Protection*, 7 EURO BUS ORG L REV 39 (2006).

¹²² See Choi, Gulati and Posner, *The Evolution of Contractual Terms* at 137 (cited in note 22) ("To force countries to internalize the risk otherwise imposed on creditors, parties [to a sovereign debt contract] may agree to contractual terms that restrict the risk-taking activities of debtors.").

¹²³ Gulati and Triantis, *Contracting Without Law* at 985 (cited in note 25).

¹²⁴ Id.

could be written that precisely identify and proscribe inefficient public spending, current citizens and governments may prefer to reap the immediate benefits of inefficient public spending and pass the long-term costs on to their successors. Second, because managing an economy is very complicated, it is more difficult (than it is in the corporate context) to specify efficient covenants in advance. Third, covenants are more useful when judicial, rather than reputational, sanctions are the primary means of enforcing the contract, because markets (unlike courts) do not care about the precise wording of an agreement when assigning blame to a debtor in default.¹²⁵

Whereas the first and second of these explanations identify potential reasons to doubt the ability of an HDB to improve the issuer's creditworthiness, the third explanation reveals a major difference between traditional covenants and the covenant-esque coupon schedule of an HDB. An HDB issuer's failure to improve the human capital of its citizens is not an event of default. Rather, default consists in neglecting to pay the higher coupons attending that failure (when it occurs while growth is booming). Because the consequences of this distinction matter for their claims, there is every reason to expect HDB holders (as well as the sovereign's potential future creditors) to be sharply attuned to it. In other words, while it may (or may not) be the case that sovereign debt investors hardly value covenants that can only be enforced with great difficulty in court, investors do value promises that increase the magnitude or decrease the risk of their claims.

These considerations also suggest a natural market for HDBs; namely, the existing fixed-rate creditors of the sovereign. Whether as part of an exchange offer in which existing creditors convert a portion of their fixed-rate claims into HDBs, or pursuant to a standard issuance whereby existing creditors purchase HDBs for fresh money, existing creditors may wish to acquire HDBs if they believe the issuer's overall creditworthiness will improve due to the combination of insurance and incentives provided by the design of the new instrument.

Admittedly, that is a big if. The issuer's creditworthiness only improves as a result of the HDB if (a) the cost to the issuer of encouraging human development is outweighed by the debt relief it earns thereby; and (b) that development translates into economic growth that is realized (or factored into expectations) before creditors' claims mature. If (a) does not obtain, there is no reason to believe the instrument would have much effect at all on the issuer's incentives. If either (a) or (b) does not obtain, then creditors simply will not value the HDB.

IV. On the Importance of Reliable Independent Monitoring

On September 10, 2015, the UN General Assembly adopted Resolution 69/319, declaring that sovereign debt restructuring should be guided by nine basic principles: (1) sovereignty, (2) good faith, (3) transparency, (4) impartiality, (5) equitable treatment, (6) sovereign immunity, (7) legitimacy, (8) sustainability and (9) majority restructuring.¹²⁶ Though six member states (including the United States) voted against it¹²⁷, Resolution 69/319 articulates an international commitment "to continue to consider improved approaches to

¹²⁵ Id. at 985–90.

¹²⁶ *Resolution 69/319: Basic Principles on Sovereign Debt Restructuring Processes*, UN General Assembly (2015).

¹²⁷ See U.N. *General Assembly Adopts "Basic Principles" on Sovereign Debt Restructuring*, HARVARD INT'L L.J. (September 20, 2015), available online at <http://www.harvardilj.org/2015/09/u-n-general-assembly-adopts-basic-principles-on-sovereign-debt-restructuring/>.

restructuring sovereign debt, taking into account the Basic Principles."¹²⁸

HDBs directly further Principle Eight ("inclusive economic growth and sustainable development"). To the extent they are sufficiently valuable to induce creditor participation in an exchange offer, HDBs also indirectly further Principle Two ("Good faith") by helping to garner "the support of a critical mass of creditors through a constructive dialogue regarding the restructuring terms."¹²⁹ However, Principle Four ("Impartiality") flags a challenge for HDBs. Mainly, without sufficiently independent measurement and reporting, they may "give rise to conflicts of interest or corruption"¹³⁰ by creating incentives for both issuer and creditors (and even citizens themselves) to fraudulently manipulate national statistics on life expectancy and educational achievement.

Indeed, for an HDB issuer, data manipulation has all the advantages of theft over honest toil. Unless the penalty for data manipulation is severe enough, it will always be cheaper for HDB issuers to reduce their debt obligations by doctoring the numbers than by keeping more people in school and alive. That penalty might be imposed by the courts of the jurisdiction whose law governs the bonds (probably New York or England), but court judgments are notoriously difficult to enforce against sovereign debtors.¹³¹ Alternatively, the penalty for data manipulation could take the form of a reputational stigma among investors, such that the fraudulent issuer's next round of borrowing is more delayed or more expensive than it otherwise would have been. While this penalty does not require the deep pockets necessary for protracted sovereign default litigation, a shortcoming of extralegal enforcement is that investors have short memories, and global economic conditions may increase demand for the debt of a recent defaulter sooner than necessary to deter abuses.

Both forms of penalty become more reliable as the involvement of the international community increases. In light of Resolution 69/319, the UN system should reinforce the independence of human development data collection processes and encourage empirical investigation into the feasibility of an HDB. Because many of the developing countries that would benefit most from issuing HDBs are rife with corruption, a redoubling of the data integrity initiatives already underway at the UNESCO Institute for Statistics and the World Health Organization would be required before the Human Development Index could be introduced as a trusted state variable in a state-contingent debt security traded on international capital markets.¹³² The power of HDBs as a lever of inclusive economic growth depends on sound data.

Even countries like the United States that did not endorse Resolution 69/319, however, have reasons to support the issuance of an HDB and the monitoring efforts needed to make it successful. First, somewhat trivially, an HDB denominated in USD and governed by New York law increases demand for America's currency and legal services. Consequently,

¹²⁸ *Resolution 69/319: Basic Principles on Sovereign Debt Restructuring Processes*, UN General Assembly (2015).

¹²⁹ *Id.*

¹³⁰ *Id.*

¹³¹ Sovereigns have relatively few attachable assets that are not protected by foreign sovereign immunity. Those that are not can only be attached with the cooperation of law enforcement in the jurisdiction where the assets are located. See Julian Schumacher, Christoph Trebesch and Henrik Enderlein, *Sovereign Defaults in Court*, Banca d'Italia (2013), available online at <http://www.bancaditalia.it/pubblicazioni/altri-atti-seminari/2014/paper-schumacher.pdf>; Foster, *Collecting From Sovereigns* (cited in note 115).

¹³² See note 94 and accompanying text.

efforts to promote the issuance of such a security ultimately redound to the health of the domestic economy by capitalizing on the stability of America's monetary policy and legal institutions. Second, Americans and their insurers and pension funds are invested in emerging market sovereign debt. Investor protection and financial stability are furthered by debt instruments that reduce sovereign default risk. Third, political stability and economic growth in the developing world reduce migration from LMI countries to the United States and Europe. Thus, the tendency of HDBs to promote inclusive growth and reduce the need for fiscal austerity is also desirable from a foreign policy perspective.

As they did from 1977–81 and 2002–06, interest rates will someday rise again. See Figure 10. When they do, and investors lose some of their appetite for emerging market debt, the LMI countries that increased bond issuances in the wake of the 2008 financial crisis may struggle to refinance their obligations.¹³³ One aim of this Essay has been to highlight the potential of state-contingent debt instruments, like an HDB, to mollify the human costs of that struggle. Another has been to assess the commercial viability of an HDB by evaluating its capacity to align the incentives of self-interested governments with those of their self-interested citizens and creditors. Still another has been merely to observe that the commercial viability of an HDB hinges on further empirical research and a redoubling of ongoing efforts to improve and standardize human development data. These are steps that can be taken now to increase the suite of instruments available for the next round of sovereign exchange offers, strengthen global financial stability and enlist international capital markets as a lever of inclusive economic growth.

¹³³ See John B. Taylor, *Foreword*, in SOVEREIGN DEBT MANAGEMENT, eds. Rosa M. Lastra and Lee Buchheit, viii (Oxford: 2014) ("Volcker made the correct decision [to end inflation by raising the discount rate shortly after becoming Chairman of the Board of Governors of the Federal Reserve in 1979], but it had the short run consequence of significantly raising debt service and making roll over of debt in many emerging markets nearly impossible.").

APPENDIX A

Low- and Middle-Income Countries That Issued Bonds in 2008–2016¹³⁴

Low-income countries	Middle-income countries	Georgia	Panama
Afghanistan	Albania	Ghana	Papua New Guinea
Benin	Algeria	Grenada	Paraguay
Burkina Faso	Angola	Guatemala	Peru
Burundi	Argentina	Guyana	Philippines
Central African Republic	Armenia	Honduras	Romania
Chad	Azerbaijan	India	Russian Federation
Comoros	Bangladesh	Indonesia	Samoa
Congo, Dem. Rep.	Belarus	Iran, Islamic Rep.	São Tomé and Príncipe
Eritrea	Belize	Jamaica	Serbia
Ethiopia	Bhutan	Jordan	Solomon Islands
Gambia, The	Bolivia	Kazakhstan	South Africa
Guinea	Bosnia and Herzegovina	Kenya	Sri Lanka
Guinea-Bissau	Botswana	Kosovo	St. Lucia
Haiti	Brazil	Kyrgyz Republic	St. Vincent and the Grenadines
Liberia	Bulgaria	Lao PDR	Sudan
Madagascar	Cabo Verde	Lebanon	Swaziland
Malawi	Cambodia	Lesotho	Syrian Arab Republic
Mali	Cameroon	Macedonia, FYR	Tajikistan
Mozambique	China	Malaysia	Thailand
Nepal	Colombia	Maldives	Tonga
Niger	Congo, Rep.	Mauritania	Tunisia
Rwanda	Costa Rica	Mauritius	Turkey
Sierra Leone	Côte d'Ivoire	Mexico	Turkmenistan
Senegal	Djibouti	Moldova	Ukraine
Somalia	Dominica	Mongolia	Uzbekistan
Tanzania	Dominican Republic	Montenegro	Vanuatu
Togo	Ecuador	Morocco	Venezuela, RB
Uganda	Egypt, Arab Rep.	Myanmar	Vietnam
Zimbabwe	El Salvador	Nicaragua	Yemen, Rep.
	Fiji	Nigeria	Zambia
	Gabon	Pakistan	

Note: Low-income countries are those with a GNI per capita of \$1,005 or less in 2016. Middle-income countries are those with a GNI per capita of more than \$1,006 but less than \$12,235. Italicized countries are IDA-only countries as of July 1, 2017; IDA-only excludes blend and IBRD countries.

 : Countries that issued or guaranteed bonds in 2008–2016

¹³⁴ *International Debt Statistics 2018* at 44 (cited in note 2). Bond issuers are identified on the basis of increases in the total amount of public or publicly guaranteed bonds outstanding, as given by the World Bank International Debt Statistics database, accessible online at <http://databank.worldbank.org/data/reports.aspx?source=international-debt-statistics>.

APPENDIX B

Figure 1. Public and Publicly-Guaranteed Debt of LMI Countries¹³⁵

Figure 2. Sub-Saharan Africa's Creditor Composition Over Time¹³⁶

¹³⁵ Author's calculations based on the World Bank International Debt Statistics database, accessible online at <http://databank.worldbank.org/data/reports.aspx?source=international-debt-statistics>.

¹³⁶ *Increasing African debt*, THE ECONOMIST (cited in note 5).

Figure 3. Dollar-Denominated Sovereign Yields in Emerging Markets¹³⁷

Figure 4. Investment in Emerging Market Sovereign Bonds by Currency Type¹³⁸

¹³⁷ Agur, Chan, Goswami and Sharma, *On International Integration of Emerging Sovereign Bond Markets* at 23 (cited in note 7).

¹³⁸ Id. at 21.

Figure 5. Determinants of the Duration of Economic Growth¹³⁹

Sources: Berg, Ostry, and Zettelmeyer (2008) and authors' calculations.

Note: For each variable, the height of the figure shows the percentage increase in spell duration resulting from an increase in that variable from the 50th to the 60th percentile, with other variables at the 50th percentile. For trade, the figure shows the benefits of having an open instead of a closed regime, using the Wacziarg and Welch (2008) dichotomous variable. For autocracy, the figure shows the effects of a move from a rating of 1 (the 50th percentile) to 0 (the 73rd percentile.)

¹³⁹ Berg and Ostry, *Inequality and Unsustainable Growth* at 12 (cited in note 30).

Figure 6. Public Investment and Social Spending as a Share of GDP¹⁴⁰

Source: IMF's Fiscal Affairs Department.

Source: World Bank's World Development Indicators and IMF's Fiscal Affairs Department.

Notes: Public investment refers to "infrastructure-related spending," while social spending is "the sum of public spending on education and health" (including both current and capital expenditures). Data represent "a cross-section of countries for the 2000-2008 period."¹⁴¹

¹⁴⁰ Atolia et. al., *Investing in Public Infrastructure* at 34 (cited in note 57).

¹⁴¹ Id. at 6.

Figure 7. Human Capital Conditions the Effect of Oil Output on Growth¹⁴²

Notes: "Marginal Effect of Oil Output" measures the effect on annual GDP growth of an increase in the ratio of barrels of oil production to GDP, for a given level of human capital. Human capital is measured by the gross secondary enrollment ratio (*i.e.*, total enrollment in secondary education divided by the size of the population of secondary-school aged children in a country). Data represent all countries with population greater than 1 million from 1979 to 2008.¹⁴³

¹⁴² Kurtz and Brooks, *Conditioning the 'Resource Curse'* at 760 (cited in note 63).

¹⁴³ *Id.* at 759, 764.

Figure 8. Three Possible Benchmark Designs for State-Contingent Debt Instruments¹⁴⁴

Benchmark/ Features	(i) “Linker”	(ii) “Floater”	(iii) “Extendible”
Currency	Local currency	Local or foreign currency	Local or foreign currency
Example of state/trigger variable	Level of nominal GDP, level of a commodity price index	Real GDP growth rate, commodity price change, or a ‘proxy’ variable such as trading partners’ real GDP growth	Discrete triggers linked to: large adverse movements in external demand, commodity prices, goods exports, financial market indices, or to natural or public health disasters
Adjustment mechanism	Principal linked to GDP. Coupon varies somewhat, as it is a fixed percentage of this principal. Principal may also have to be floored to suit the preferences of some investors.	Coupon linked to the growth of GDP, but with a floor of zero. Principal is fixed. Coupon may vary a lot, but could be capped.	Pre-defined extension of the principal payment by 1–3 years. Possible increase in coupon if triggered
Tenor	>=5 years, including perpetuity bond	>=5 years	Varies depending on the trigger and extension period
Main purpose	Stabilizes debt/GDP over the economic cycle and in tail events. Supports counter- cyclical policies and reduces default risk	Provides debt service relief during recessions, but does not assure a stable debt ratio as principal is fixed	Provides substantial liquidity support during times of distress. No direct impact on the debt level
Target issuers	Primarily AEs and EMs with established local currency markets	All economies, but especially EMs with limited access to capital markets	EMs with limited access to capital markets; countries vulnerable to natural disasters; commodity exporters
Target investors	Domestic pension funds and long-term investors; foreign investors	Mainly foreign investors seeking yield	Investors with little liquidity risk; yield and diversification investors; insurers and reinsurers (esp. for disaster insurance)

¹⁴⁴ *State-Contingent Debt Instruments for Sovereigns* at 32 (cited in note 71).

Figure 9. HDB Coupon Rates Depend on GDP Growth, Human Development (h) and a Weighting Factor (k)

Notes: These graphs are based on coupon formula (3) in Part II.A. Expected GDP growth ($\bar{g}$) is normalized to zero. In a sample of 179 countries for which human development data are available for one or more 5-year intervals between 1990–2015, 2.5%, 4.4% and 7.3% correspond to the first, second and third quartiles of human development improvement over 5 years, respectively. The red lines, which are identical in each graph, correspond to a scenario in which human development does not improve ($h = 0$); under this specification, that scenario results in a coupon equivalent to that of a

standard GDP-linked bond. h is calculated as the growth rate of a geometrically-weighted average of the health and education components of the Human Development Index.

Figure 10. U.S. Discount Rates (Monthly)