IN THE ARBITRATION

UNDER THE UNITED STATES – PERU TRADE PROMOTION AGREEMENT

GRAMERCY FUNDS MANAGEMENT LLC, and	)
GRAMERCY PERU HOLDINGS LLC	)
	)
Claimants,	)
	)
v.	)
	)
THE REPUBLIC OF PERU	)
	)
Respondent.	)

EXPERT REPORT OF SEBASTIAN EDWARDS

JUNE 2, 2016

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I. INTRODUCTION

A. Qualifications

1. I am a Professor of Business Economics at the Anderson Graduate School of Management and the Henry Ford II Chair in International Management at the University of California, Los Angeles (UCLA). I am also a research associate of the National Bureau of Economic Research (NBER), a member of the advisory board of Transnational Research Corporation, and co-chairman of the Inter-American Seminar on Economics (IASE).

2. From 1993 to 1996, I served as the Chief Economist for the Latin America and Caribbean region of the World Bank. From 2001 to 2003, I served as the President of the Latin American and Caribbean Economic Association (LACEA).

3. I am or have been an associate editor of *Analisis Economico*, *The Journal of International Trade & Economic Development*, the *Journal of International Financial Markets, Institutions & Money*, and other scholarly journals. For almost ten years, I served as the co-editor of the *Journal of Development Economics*. I have published widely on international economics, macroeconomics, the economics of Latin America, inflation, exchange rates, and economic development. My work and opinions have been frequently quoted in the media, including *The New York Times*, *Financial Times*, *Los Angeles Times*, *The Wall Street Journal*, and *The Economist*. I am the author of several books, including Toxic Aid: Economic Collapse and Recovery in Tanzania (Oxford University Press, 2004), Left Behind: Latin America and the False Promise of Populism (The University of Chicago Press, 2010), Preventing Currency Crises in Emerging Markets (edited with Professor Jeffrey Frankel of Harvard University, 2002), and Crisis and Reform in Latin America: From Despair to Hope (Oxford University Press, 1995). In 2012 I was the awarded the Carlos Díaz-Alejandro Prize, which is conferred bi-annually to an academic who has made a significant contribution to the economic analysis of issues relevant to Latin America.

4. I have been retained as a consultant to a number of multilateral institutions, including the Inter-American Development Bank, the International Monetary Fund (the "IMF"), the Organization for Economic Co-operation and Development (the "OECD"), and the World Bank. I have consulted to the United States Agency for International Development and to various national and international corporations. I have worked as an economist in Argentina, Bolivia, Chile, Colombia, Costa Rica, Guatemala, Honduras, Indonesia, Korea, Mexico, Morocco, New Zealand, Nicaragua, Tanzania, and Venezuela. My curriculum vitae is attached to this report as **Appendix A**.

5. I am being compensated in this matter at a rate of $850 per hour. I have been assisted by others working under my direction and supervision. I receive additional compensation based on their professional fees associated with my work in this matter. My compensation is not contingent on the content of my opinions or on the outcome of this matter.

B. Assignment

6. I have been retained as an independent expert in this matter by the Claimants ("Gramercy"). Gramercy has asked me to value its portfolio of agrarian reform bonds issued by the Republic of Peru ("Peru"), and to assess the updating methodology proposed by Peru's Ministry of Economy and Finance (the "MEF"). In addition, Gramercy has asked me to provide opinions regarding Peru's economic and financial capacity to repay Gramercy and other bondholders the updated value of all of the outstanding land bonds (as described below, this refers to bonds issued in Peru in the late 1960s, 1970s, and 1980s, in exchange for expropriated land). All calculations of value are made through April 30, 2016. I reserve the right to update these calculations as needed.

C. Materials Relied Upon

7. In carrying out this assignment, I have reviewed filings relevant to this matter as well as publically available economic literature, and other information. Certain documents were in their original Spanish. However, for the purposes of writing this report, I requested that certain documents be translated into English, so that they could be quoted in English. I also received data from Gramercy about their portfolio of

Peruvian land bonds. A complete list of the materials that I have relied upon is included as **Appendix B** to this report.

D. Summary of Conclusions

8. As Peru's Congress and Constitutional Tribunal have recognized, the value of the defaulted land bonds issued by Peru in the late 1960s, 1970s and1980s must be updated to account for the value-eroding effect of the severe inflation experienced in Peru, particularly in the 1980s and early 1990s. The use of consumer price indexes and comparable inflation indices to update values has been, and continues to be, prevalent in Peru, in other Latin American countries, and in countries around the world. The Consumer Price Index Method ("CPI Method"), which indexes the unpaid principal amount of a land bond to Peruvian inflation, is the most conceptually sound method for updating the value of the land bonds to account for inflation. The CPI Method is also straightforward to perform and requires few assumptions.

9. An alternative approach, the Dollarization Method, which the Constitutional Tribunal specified in a 2013 Order, is conceptually similar to the CPI Method, and should, in theory, therefore yield a similar result. The Dollarization Method is, however, somewhat more difficult to implement and requires several more assumptions than does the CPI Method and is thus, in my opinion, inferior to the CPI Method. In any event, the MEF has created a dollarization method (hereafter referred to as the "MEF Formula") that is critically flawed in two primary respects. First, the MEF Formula estimates a "parity exchange rate" that is nothing of the sort—it is nonsensical, and is a mathematically and economically meaningless input that serves only to artificially depress the updated value of a land bond. Second, the MEF Formula calls for the application of an interest rate based on the yields on 1-year U.S. Treasury bills. It is unclear whether the MEF intended this interest rate to capture the rate of (expected) U.S. inflation, reflect an expected rate of return, or both. Regardless, the yields on 1-year U.S. Treasury bills, which reflect expected returns in the U.S., are divorced from the expected returns from investing in the Peruvian economy, which is the appropriate construct. Third, interest accrues only through December 2013, and U.S. dollars are converted back to Peruvian Nuevos Soles ("Soles") at the official 2013

exchange rate. As a result of these errors, the methodology proposed by the MEF has no economic basis and yields valuations for all bonds that are arbitrarily low.

10. In addition to the erosion of the value of the bonds due to the severe inflation experienced in Peru, as a result of the default bondholders also lost the opportunity to invest the unpaid principal and earn a rate of return on their investments. To compensate for this lost opportunity, it is necessary to apply an interest rate to the outstanding amount of the land bonds, and compound that interest from Peru's default through the present day. This interest rate should be a real, rather than nominal, interest rate, because the CPI and Dollarization Methods separately account for the effect of inflation. Furthermore, this real interest rate should reflect bondholders' forgone investment opportunities in Peru. I estimate a conservative real interest rate in Peru by first calculating the real return on capital in Peru and then, based on that measure, deriving estimates of the real rates of return on debt and equity in Peru. I rely on my estimate of the real rate of return on debt of 7.45 percent, the derivation of which is based on several highly conservative assumptions, as the real interest rate to update the value of the land bonds.

11. Applying the CPI Method, and using a real interest rate of 7.45 percent, I determine that, as of April 30, 2016, the updated value of Gramercy's portfolio of land bonds is 5.34 billion Soles, or $1.63 billion.

12. I estimate that the full amount owed by Peru to land reform bondholders is between $7.99 billion and $10.65 billion. Peru's economic recovery since the 1990s is nothing short of remarkable, and its macroeconomic condition is strong. Even with full repayment of the debt, financed by the issuance of new debt, Peru's debt-to-GDP ratio would be well within the norms of economically stable, developed and developing countries. Peru runs small deficits and is expected to continue to do so; even with the additional debt payments, Peru would not struggle to make these payments or payments on other existing obligations. In addition, by committing to repay the full value of the outstanding land bonds, Peru could send a strong signal to investors, improve its debt rating, and lower its cost of borrowing.

II. BACKGROUND

13. In this section, I provide background information on Peru's economic and political history. The purpose of this discussion is to provide context regarding (1) the rationale for updating the value of the land bonds and (2) why an updating methodology based on Peru's consumer price index is the appropriate means by which to do so. I begin by describing the economic and political conditions that led the Peruvian government to expropriate farmland, issue the land bonds in exchange for the farmland, and subsequently default on the bonds. I then provide an overview of the spectacular economic recovery and growth in Peru over the past 25 years, the Constitutional Tribunal's decisions, and the Supreme Decrees related to the land bonds.

A. Conditions Leading to Peru's Expropriation of Farmland and Issuance of Land Bonds

14. Throughout the first half of the 20th century, economic policy and political authority in Peru followed a cyclical pattern marked by instability. Such political and economic cycles, which I have studied throughout my career, were common in Latin American countries throughout most of the 20th century.[1]

15. In 1963, the newly-elected president Fernando Belaúnde significantly expanded government spending in an effort to industrialize Peru.[2] Along with many development economists and politicians at that time, Belaúnde and his advisers believed that the way to encourage manufacturing was by protecting local industries through high import tariffs and import quotas and licenses, an approach to economic development that has come to be known as Import Substitution Industrialization ("ISI"). Much of the industrialization effort was financed by government debt and expansive monetary policy.

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1 **CE-64**, Dornbusch & Edwards, *The Macroeconomics of Populism*, in The Macroeconomics of Populism in Latin America (Dornbusch & Edwards eds.), January 1991, p. 7.

2 **CE-63**, Lago, *The Illusion of Pursuing Redistribution through Macropolicy: Peru's Heterodox Experience 1985-1990*, in The Macroeconomics of Populism in Latin America (Dornbusch & Edwards eds.), January 1991, pp. 266.

16. By 1967, economic growth had slowed, and by December 1967, inflation spiked to over 20 percent on a year-over-year basis. *See* **Appendices D and E**. As real fiscal deficits and inflation increased, the currency (the Sol Oro), which was fixed to the U.S. dollar, became overvalued and both domestic and foreign capital fled Peru. In 1967, Belaúnde was forced to devalue the currency.[3]

17. In October 1968, a coup d'état placed General Juan Velasco in charge of the country.[4] Velasco, a leftist, vowed to end extreme poverty and promote the interests of the workers through a program focusing on expropriation, enhancing ISI, redistributing wealth, and expanding government spending. The military government publicly stated its intention to remain in power long enough to carry out extensive reforms.[5]

18. In 1969, Velasco implemented an updated agrarian reform law that was considerably more aggressive than that passed by Belaúnde five years prior.[6] This updated law resulted in the expropriation of all landholdings comprising more than 150 hectares along the coast and 15 to 55 hectares in the inland region of the country, without exception.[7] The government seized refineries, mills, and other businesses operating on these lands, and a large number of private businesses were turned into cooperatives owned and operated by the workers.[8]

19. By 1979, the government had expropriated more than 15,000 farms and over 9 million hectares of land, as well as unknown amounts of farming equipment.[9] As compensation to those whose lands and property had been seized, the government

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3 **CE-170**, Pastor, *Peru: Monetary and Exchange Rate Policies, 1930-1980*, June 2012, p. 40. .

4 **CE-47**, Central Intelligence Agency, Directorate of Intelligence Memorandum, *The Peruvian Coup: Reasons and Prospects*, February 12, 1969.

5 **CE-47**, Central Intelligence Agency, Directorate of Intelligence Memorandum, *The Peruvian Coup: Reasons and Prospects*, February 12, 1969, p. 6.

6 **CE-1**, Decree Law N° 17716, Land Reform Act, June 24, 1969.

7 **CE-60**, Lastarria-Cornhiel, *Agrarian Reforms of the 1960s and 1970s in Peru*, in Searching for Agrarian Reform in Latin America (Thiesenhusen ed.), 1989, p. 139.

8 **CE-60**, Lastarria-Cornhiel, *Agrarian Reforms of the 1960s and 1970s in Peru*, in Searching for Agrarian Reform in Latin America (Thiesenhusen ed.), 1989, pp. 139-140.

9 **CE-02**, José Matos Mar and José Manuel Mejía, "La Reforma Agraria en el Perú," Instituto de Estudios Peruanos, 1980, p. 171.

issued bonds. These land bonds, some of which are now held by Gramercy, are the land bonds at issue in this matter.

B. Economic Deterioration, Severe Inflation, and Default

20. Between 1969 and 1974, Peru experienced stable economic growth in real terms. However, much of this growth was fueled by government spending and, consequently, between 1970 and 1974, deficits soared from under one percent of gross domestic product ("GDP") to over six percent of GDP.[10] *See* **Appendix F.** Fiscal largesse eventually led to rapid inflation, which reached 19 percent on a year-over-year basis by December 1974. As government deficits grew to unsustainable levels and inflation increased, the government, which had initially relied on foreign debt to finance its spending, could no longer afford to pay its bills. In 1975, Velasco was removed from power through an internal coup d'état and replaced by his prime minister, General Morales Bermúdez.[11]

21. By 1977, Bermúdez had begun to liberalize the economy, opening it up to foreign investment and outlining a plan to return the country to democracy by 1980. Despite these developments, the state of Peru's economy continued to worsen, with inflation rising to nearly 80 percent annually in the late 1970s. *See* **Appendices D-F**. Per capita income, which stagnated in the mid-1970s, declined over the following years.[12]

22. In the 1980s, the IMF worked with the Peruvian government to implement a number of stabilization programs, none of which proved successful.[13] Inflation remained at more than 60 percent annually throughout the 1980s, leading the government to redenominate its currency in 1985. In 1988, inflation grew out of control, and at times during 1988 and 1990, the country experienced hyperinflation, a condition in

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[10] High commodity prices also contributed to the economic boom during this period.

[11] **CE-63**, Lago, *The Illusion of Pursuing Redistribution through Macropolicy: Peru's Heterodox Experience 1985-1990*, in The Macroeconomics of Populism in Latin America (Dornbusch & Edwards eds.), January 1991, p. 266.

[12] **CE-63**, Lago, *The Illusion of Pursuing Redistribution through Macropolicy: Peru's Heterodox Experience 1985-1990*, in The Macroeconomics of Populism in Latin America (Dornbusch & Edwards eds.), January 1991, p. 266.

[13] **CE-65**, Pastor & Wise, *Peruvian Economic Policy in the 1980s: From Orthodoxy to Heterodoxy and Back*, Kellogg Institute Working Paper 161, pp. 3-9.

which price increases exceed 50 percent per month.[14] In August 1990, the year-over-year rate of inflation reached an astonishing 12,000 percent, leading the government again to redenominate the currency in 1991. *See* **Appendix D**. Real GDP growth fluctuated widely, with the economy contracting dramatically between 1988 and 1990. *See* **Appendix E.** The government continued to run exceedingly large deficits as a percentage of GDP throughout the period. *See* **Appendix F**.

23. In the face of this extreme economic instability and hyperinflation, and despite the fact that the land bonds had become virtually worthless as the Peruvian currency lost value, Peru ceased making payments on the bonds in the 1980s.[15] In 1992, Peru liquidated the Agrarian Bank, through which payments on the land bonds had been made, defaulting completely on its outstanding obligations.[16]

C. Reforms, Economic Recovery, and Entry into Global Financial Markets

24. Peru's remarkable turnaround began in the early 1990s, when the government started promoting aggressive economic stabilization and liberalization policies. Led by President Alberto Fujimori, who had been elected in July 1990, and under the technical supervision of Minister Carlos Boloña, the government implemented a set of economic reform policies that broadly conformed to what has come to be known as the "Washington Consensus."[17] The policies, supported by the IMF, the World Bank, and the United States, included imposing fiscal discipline, removing distortions, liberalizing trade, privatizing government-owned businesses, and strengthening property rights.[18] The government actively courted foreign investment, enacting the Foreign Investment Promotion Law and the Framework Law for Private Investment Growth, and encouraged foreign investors to invest in newly-privatized enterprises

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[14] **CE-43**, Cagan, *The Monetary Dynamics of Hyperinflation*, in Studies in the Quantity Theory of Money (Friedman ed.), 1956, pp. 25-27.

[15] **CE-219**, Porzecanski, *Peru's Selective Default: A Stain on Its Creditworthiness*, American University Working Paper Series, Paper No. 2016-1, January 28, 2016, p. 3.

[16] **CE-7**, Decree Law N° 25478, May 8, 1992.

[17] *See* **CE-138**, U.S. Department of State, 2009 Investment Climate Statement – Peru.

[18] **CE-86**, Dancourt, *Neoliberal Reforms and Macroeconomic Policy in Peru*, CEPAL Review, No. 67, April 1999, pp. 51-73. Distortions are government interventions in markets intended to change market participants' behavior. These often include subsidies and price controls.

that had previously been state-owned.[19] At the time, similar reforms were undertaken throughout the region. To a large extent, the objective of these reforms was to replicate the "East Asian" miracle in Latin America.

25. Fujimori's rapid implementation of these policies, dubbed the "Fujishock," and the economic recovery and sustained economic growth that followed these reforms, were astounding and nearly unprecedented. After decades of economic crises, rapid inflation, and instability, the Peruvian economy steadied and then proceeded to grow rapidly for over 20 years, becoming one of the most stable countries in Latin America. Remarkably, this economic growth has continued despite a number of political crises. While Fujimori's economic reforms proved successful, they were enacted in an arguably un-democratic and authoritarian manner. Fujimori executed a "self-coup d'état" in 1992, through which he dissolved the Congress and Judiciary, and further seized control of the country.[20] Fujimori also brutally responded to dissidents, and was recently sentenced to 25 years in prison for "crimes against humanity" for his role in the kidnapping and murder of leftist rebels during the 1990s.[21]

26. In the early 1990s, as a result of Fujimori's economic reforms, inflation declined dramatically, falling to 11 percent in 1995, and continued to decrease through the end of the decade. Inflation stabilized in the early 2000s and has remained under 5 percent annually each year thereafter except in 2008, the year in which the global financial crisis erupted. *See* **Appendix D**. This is, indeed, a major accomplishment for a country that just a few years earlier was beset by crisis and hyperinflation.

27. Concomitantly, the Peruvian economy began to grow in the mid-1990s, maintaining robust real GDP growth from the 2000s through the present day. *See* **Appendix E**. The government continued to run budget deficits, though the deficits were much smaller than those of the 1970s and 1980s. Since the mid-2000s, the government has mostly run small budget surpluses. *See* **Appendix F**.

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[19] **CE-138**, U.S. Department of State, 2009 Investment Climate Statement – Peru.

[20] **CE-70**, Lane, The 'Self-Coup' That Rocked Peru, Newsweek, April 19, 1992.

[21] **CE-140,** Romero, Peru's Ex-President Convicted of Rights Abuses, New York Times, April 7, 2009.

28. Peru's miraculous turnaround and subsequent strong economic performance facilitated its entry into the world financial markets. In 2002, Peru registered with the U.S. Securities and Exchange Commission ("SEC") to issue dollar-denominated bonds, and Peru has also entered into numerous foreign trade and investment agreements, including the Trade Promotion Agreement with the United States, which was entered into force on February 1, 2009. [22]

29. Peru's transition from a high-risk country on the periphery of world financial markets to a secure and active participant in those markets is reflected in the significant improvement of the country's credit rating. From 1984 through 1997, Peru remained in default on syndicated loans from international counterparties. Peru only cured these outstanding defaults in 1997, when it finalized a Brady agreement to issue Brady bonds.[23] Until Peru initiated restructuring negotiations under the Brady Plan in 1996, Peru was effectively isolated from world financial markets. [24] In February 1996, Moody's began rating Peru's sovereign debt, issuing a very low foreign currency long-term debt rating of "B2," five notches below investment grade.[25] In October 2000, Moody's upgraded Peru's foreign currency long-term debt rating two notches to "Ba3," a below-investment-grade rating, indicating that Peru demonstrated "below-average creditworthiness."[26] Peru first achieved an investment-grade rating

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22 **CE-93**, Prospectus Supplement to Prospectus dated November 14, 2002, filed November 25, 2002; **CE-233**, Office of the United States Trade Representative, Peru Trade Promotion Agreement.

23 Proposed by United States Treasury Secretary Nicholas Brady, the Brady Plan included a debt-reduction agreement (called the Brady Agreement), which was intended to help Latin American countries cure defaults on bank loans that occurred during the 1980s. The agreements allowed Latin American countries to convert the illiquid bank loans that were in default into more liquid "Brady bonds."

24 **CE-143**, Monteagudo, *Peru's Experience in Sovereign Debt Management and Litigation: Some Lessons for the Legal Approach to Sovereign Indebtedness*, 2010.

25 **CE-83**, Moody's Investors Service, Moody's Assigns B2 Sovereign Ceiling For Bonds, B3 Sovereign Ceiling For Bank Deposits And Not Prime Sovereign Ceiling For Short-Term Obligations To Peru, February 5, 1996. A Moody's rating in the "B" range indicates "weak creditworthiness." **CE-229**, Moody's Investors Service, Rating Symbols and Definitions, May 2016.

26 **CE-87**, Moody's Investors Service, Moody's Upgrades Peruvian Brady Bonds To Ba3, October 5, 2000;**CE-229**, Moody's Investors Service, Rating Symbols and Definitions, May 2016.

in December 2009, with Moody's raising Peru's long-term debt rating to "Baa3."[27] Over the past seven years, Moody's has continued to upgrade Peru's credit rating, assigning Peru a rating of "A3" in July 2014, which is well above investment grade status and which reflects Moody's view of "low credit risk."[28] While these ratings have been called into question, due to the manner in which Moody's has accounted for the land bond default, they nevertheless reflect Peru's extraordinary transition from an unrated, highly risky debt issuer to an investment-grade, low-risk debt issuer over the span of just two decades.

D. Peruvian Rulings Regarding the Land Bonds

30. Even as Peru's economy has recovered and thrived, the land bonds have remained unpaid, creating a clear tension. On the one hand, Peru had joined the select group of emerging nations that pursued market orientation in a successful way, although, on the other hand, there were large debts that remained outstanding and in default. In 2001, Peru's Constitutional Tribunal ruled that the Peruvian government was required to compensate the unpaid bondholders, citing the Constitution:

> No person may be stripped of their property except for the exclusive reasons of national security or public necessity, declared by law, and upon payment in cash of fair compensation which shall include compensation for potential damage.[29]

31. The Constitutional Tribunal ruled that "merely nominal payment" would not suffice, and that "the value of the expropriated lands shall be paid at market value and in cash," explicitly tying the value of the land bonds back to the value of the expropriated land.[30]

32. In May 2005, the Agrarian Commission of the Peruvian Congress studied the cost of repaying the land bonds and recommended a bill that was intended to effect a

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[27] **CE-141**, Moody's Investors Service, Moody's Upgrades Peru's Foreign Currency Ratings, December 16, 2009; *see also* **CE-127**, Moody's Investors Service, Moody's Upgrades Peru's Foreign-Currency Ratings, July 16, 2007.

[28] **CE-194**, Moody's Investors Service, Moody's Upgrades Peru's Rating to A3 from Baa2; Outlook Stable, July 2, 2014; **CE-229**, Moody's Investors Service, Rating Symbols and Definitions, May 2016.

[29] **CE-11**, Constitutional Tribunal, Decision, Exp. N° 022-96-I/TC, March 15, 2001, p. 3.

[30] **CE-11**, Constitutional Tribunal, Decision, Exp. N° 022-96-I/TC, March 15, 2001, p. 3.

repayment plan.[31] In 2011, Congress approved a draft bill mandating the repayment of the bonds.[32] In 2013, the Constitutional Tribunal reinforced its 2001 decision, again stating that the land bonds were to be repaid on the basis of value that was to be updated to the present day.[33] The Tribunal also considered methods to update the value of the land bonds to the present, and rejected a method of updating the value of the bonds based on Peruvian inflation as measured by the CPI, holding that "in times of deep economic crisis, the CPI gets disconnected from economic reality."[34] The Tribunal further stated that a CPI-based method yielded "an amount that could not be paid by the debtor." [35] The Tribunal instead held that the correct updating method was a dollarization approach, which converted the unpaid principal of the bonds into U.S. dollars and accrued interest on that principal, and noted that the repayment of the smaller updated value produced by this method would stand to have a far lesser impact on Peru's budget.[36] Based on this reasoning, the Tribunal instructed Peru's executive branch to issue a Supreme Decree specifying the dollarization-based formula under which the land bond values were to be updated as well as the forms of payment.[37]

33. In January 2014, the MEF issued Supreme Decrees 17-2014-EF and 19-2014-EF, specifying the dollarization-based formula, under which the value of the land bonds could be updated based on the Constitutional Tribunal's 2013 Order. [38] As I discuss in detail below, this formula, which I have referred to as the MEF Formula, suffers from several flaws and is not an economically justifiable or rational method for updating the bonds to current value.

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[31] **CE-12**, Opinion issued on Draft Laws N° 578/2001-CR, N° 7440/2002-CR, N° 8988/2003-CR, N° 10599/2003-CR N° 11459/2004-CR, and N° 11971/2004-CR.

[32] **CE-13**, Patricia Velez and Terry Wade, "Peru's Congress approves bill to pay land bonds," Reuters, July 19, 2011.

[33] **CE-17**, Constitutional Tribunal of Peru, Order, July 16, 2013.

[34] *Id.* ¶23.

[35] *Id.* ¶23.

[36] *Id.*

[37] *Id.*

[38] **CE-37**, Supreme Decree N° 17-2014-EF; **CE-38**, Supreme Decree N° 19-2014-EF.

III. GRAMERCY'S LAND BOND PORTFOLIO AND THE ECONOMIC RATIONALE FOR UPDATING THE VALUE OF THE LAND BONDS

34. In this section, I first describe the relevant characteristics of Gramercy's land bond portfolio. Second, I explain how Peru's experience with severe inflation has eroded the economic value of the land bonds, and thus why it is necessary to update the value of the bonds in order to provide adequate compensation. Finally, I explain why the value of the bonds must also be updated to reflect the opportunity cost of capital.

A. Gramercy's Land Bond Portfolio

35. I understand that Gramercy purchased land bonds between 2006 and 2008. Gramercy currently holds a portfolio of 9,773 bonds.

36. These bonds belong to one of three classes, Class A, Class B, and Class C, which are distinguished by factors including the bonds' stated coupon rates and stated terms:

- Class A bonds have a stated coupon rate of 6 percent and a stated term of 20 years. Gramercy holds 430 Class A bonds.
- Class B bonds have a stated coupon rate of 5 percent and a stated term of 25 years. Gramercy holds 8,521 Class B bonds.
- Class C bonds have a stated coupon rate of 4 percent and a stated term of 30 years. Gramercy holds 822 Class C bonds.

37. The scheduled repayment structure of all three classes of bonds provided for annual coupon payments comprising a fixed and equal repayment of principal as well as interest payments on the then-outstanding principal balances.[39]

38. **Appendix G** presents summary information regarding the stated coupon rates, stated terms, and initial and outstanding face values of Gramercy's land bonds by class. Gramercy's land bonds had a total initial face value of 692 million Soles de Oro ("Soles Oro"), 56 percent of which remains outstanding. 2,655 of Gramercy's bonds are "unclipped" bonds that have all coupons physically intact, while 7,118 of Gramercy's bonds are "clipped" bonds that have had at least one coupon physically

[39] *See, e.g.*, **CE-120**, Bond No. 008615, November 28, 1972.

clipped, either because the payment associated with the coupon was made, the coupon was used as legal tender, or the coupon was lost.

39. **Appendix H** presents the outstanding face values of Gramercy's land bonds by class and year of issuance (sometimes also referred to as "placement year"). The earliest of these bonds was issued in 1970, while the most recent of these bonds was issued in 1981. A total of 385 million Soles Oro face value of Gramercy's land bond portfolio is still outstanding.

B. The Economic Rationale for Updating the Value of the Land Bonds to Account for the Impact of Inflation

40. As I described in Section II above, in the decades following the issuance of the land bonds, Peru experienced prolonged periods of rapid inflation. As a result, in 1985, the government redenominated the currency from Soles Oro to Intis, with 1 Inti being equivalent to 1,000 Soles Oro. In 1991, the government again redenominated the currency, from Intis to Nuevos Soles (Soles), with 1 Sol being equivalent to 1,000,000 Intis.[40] Thus, 1 Sol is equivalent to 1 billion Soles Oro:

$$\frac{1\ Sol}{1{,}000\ Intis} \times \frac{1\ Inti}{1{,}000{,}000\ Soles\ Oro} = \frac{1\ Sol}{1{,}000{,}000{,}000\ Soles\ Oro}$$

41. Due to the severe inflation experienced in Peru, the purchasing power of a Sol Oro at the time the land bonds were issued was much greater than would be the purchasing power of a Sol Oro today. To see this, consider the following example: suppose that Peru had given a landowner 100,000 Soles Oro in cash in January 1970, when the earliest of Gramercy's land bonds were issued, in exchange for his or her land. Assume that, at that time, 100,000 Soles Oro might have been enough money to purchase a new car. In the more than 46 years that have since passed, annual inflation in Peru has averaged nearly 57 percent.[41] Thus, leaving aside other factors such as technological advancements that would bear on the cost of a car, the

[40] **CE-235**, Central Reserve Bank of Peru, Billetes y Monedas.

[41] **CE-238**, Central Reserve Bank of Peru, Inflación.

landowner would need the equivalent of roughly *103 trillion* Soles Oro to purchase a new car today:

$$100{,}000\ Soles\ Oro\ \times (1 + 0.57)^{46} = 102{,}655{,}922{,}680{,}316\ Soles\ Oro$$

42. Of course, Peru provided landowners with bonds in lieu of cash in exchange for their land. As a consequence, the hypothetical landowner was not able to purchase the car for 100,000 Soles Oro in 1970, and has had to wait to receive his compensation. If he is to be paid now, many years later, he would have to receive not the nominal amount due to him in 1970 – 100,000 Soles Oro – but the amount of money that would allow him to purchase the same car – or other goods and services – that he could have purchased in 1970 with 100,000 Soles Oro. The landowner would only be adequately compensated today if the amount of repayment were based on an updated value of the bond that accounted for the effect of inflation. In other words, adequate compensation for the effects of severe inflation is the amount of money that would allow the landowner to purchase the same kind of car today that the face value of the bond would have allowed the landowner to purchase in January 1970.

43. I understand that the Constitutional Tribunal found in its March 2001 decision that a "basic sense of justice" calls for "[the] valuation of and payment for the expropriated lands."[42] I further understand that this judgment reaffirmed the valuation principle established in Article 1236 of Peru's Civil Code and Article 70 of its Constitution. With respect to this valuation principle, Counsel has informed me that Article 1236 of the Civil Code provides that when "the value of an obligation must be restored, said value shall be calculated at the value it has on the date of payment, unless otherwise provided by law or agreement to the contrary."[43] This reasoning reflects the fact that, in the absence of an appropriate adjustment, the economic value of an obligation at a point in the past may differ dramatically from the economic value of that same obligation at the present day due to, for instance, the impact of inflation on the purchasing power of the amount payable.

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[42] **CE-11**, Constitutional Tribunal, Decision, Exp. N° 022-96-I/TC, March 15, 2001, p. 3.

[43] **CE-55**, Peruvian Civil Code, Article 1236, 1984. Counsel has informed me that there is no law or contract that would require the repayment of the obligation at a value other than the value at the time of payment.

C. The Economic Rationale for Updating the Value of the Land Bonds to Account for the Opportunity Cost of Capital

44. The severe inflation experienced in Peru is only one source of value diminution experienced by the bondholders. When Peru defaulted on the land bonds, the bondholders were also deprived of the concomitant benefit of spending that money on goods and services or investing that money and earning a return. To properly update the value of the land bonds, it is therefore necessary also to account for the cost of that foregone opportunity, which economists typically do by estimating and applying a rate of return.

45. As I discuss in detail in Section VI, I estimate a real rate of return on capital using data on Peru's National Accounts. From that, I then derive an estimate of the real return on debt in Peru, which is 7.45 percent. I apply this rate in both the CPI Method and the Dollarization Method.

46. This rate of return should be applied on a compound basis rather than a simple basis. Compound interest and simple interest differ in that compound interest reflects the opportunity to re-invest returns from previous periods and, in effect, earn a return on those returns in future periods.[44]

47. In updating the value of the land bonds, the assumption of compound interest is appropriate, insofar as a bondholder would have expected to (1) earn periodic returns on his or her investment, and (2) be able to re-invest those returns to earn further returns. The assumption of simple interest would be tantamount to denying a bondholder the ability to re-invest his or her returns, and would therefore underestimate the appropriate amount of compensation.

48. The use of compound interest is prevalent throughout the financial world and, most pertinently, bond markets.[45] In accruing interest on an amount on a compounding

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[44] *See, e.g.*, **CE-94**, Brealey, et al., *Principles of Corporate Finance*, 7th Ed., 2003, p. 40 ("There is an important distinction between compound interest and simple interest. When money is invested at compound interest, each interest payment is reinvested to earn more interest in subsequent periods. In contrast, the opportunity to earn interest on interest is not provided by an investment that pays only simple interest.")

[45] *See, e.g.*, **CE-94**, Brealey, et al., *Principles of Corporate Finance*, 7th Ed., 2003, p. 41 ("Problems in finance almost always involve compound interest rather than simple interest, and therefore financial people always

basis, that amount is essentially brought forward from a past point in time to the present. The opposite of compounding is referred to as discounting, in which future cash flows are brought back to the present.[46] The price of a bond (or any asset for that matter) is the present value of its expected future cash flows, discounted on a compounding basis.[47] While some commercial contracts do call for simple interest, such contracts are almost exclusively short-term contracts of known duration.[48] Here, the land bonds now held by Gramercy have been outstanding for as many as 46 years.

49. Furthermore, it has long been recognized that "[c]ompound interest is the only logical method of computing interest," that "[t]he reason for introducing simple interest at all is … for convenience, to make computations easier even if the results are not quite correct," and that the only drawback of compound interest is that it "involves something more than grammar school arithmetic."[49]

50. The MEF Formula, which, as I discuss below, suffers from severe flaws, is at least sound in calling for compound interest (albeit at an inappropriate rate) rather than simple interest. In addition, Supreme Decree 088, issued by the Peruvian government in 2000, also called for the use of compound interest in updating the value of the land bonds.[50]

51. The principle that the compensation to be paid to the bondholders must account for the adverse effect of severe inflation and the opportunity cost of capital is, to the best of my understanding, not in dispute. The pertinent question, which I address below,

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assume that you are talking about compound interest unless you specify otherwise."); *see also* **CE-145**, Fabozzi, *Bond Markets, Analysis and Strategies*, 7th Ed., 2010.

46 *See, e.g.*, **CE-144**, Ross et al., *Corporate Finance*, 9th Ed., 2010, pp. 91-97.

47 *See, e.g.*, **CE-145**, Fabozzi, *Bond Markets, Analysis and Strategies*, 7th Ed., 2010, pp. 19-24; **CE-94**, Brealey, et al., *Principles of Corporate Finance*, 7th Ed., 2003, p. 41 ("Discounting is a process of *compound* interest.") (emphasis added).

48 This is true today as it was 70 years ago—*see* **CE-42**, Philip, *A Note on Simple Interest*, National Mathematics Magazine, Vol. 19, No. 8, May 1945, p. 414: "Simple interest is usually calculated for relatively short periods of time, usually a year or less than a year."

49 **CE-42**, Philip, *A Note on Simple Interest*, National Mathematics Magazine, Vol. 19, No. 8, May 1945, pp. 414-417; **CE-41**, Kershner, *Note on Compound Interest*, The American Mathematical Monthly, Vol. 47, No. 4, April 1940, p. 196.

50 **CE-88**, Emergency Decree No. 088-2000, October 10, 2000, Article 5.

is how to do so in order to genuinely satisfy that principle and adequately compensate the bondholders.

IV. UPDATING THE VALUE OF THE LAND BONDS USING THE CPI METHOD

52. In this section, I explain why the CPI Method is the most appropriate approach for updating the value of the land bonds. I begin by briefly describing how CPIs are constructed and interpreted. I then recount the numerous contexts in which countries, both Latin American (including Peru) and elsewhere, have employed and continue to employ CPI to update nominal values in the face of high rates of inflation. I conclude by (1) demonstrating the determination of the updated value of a land bond under the CPI Method using an exemplar bond from Gramercy's portfolio, and (2) calculating the updated value of Gramercy's entire portfolio of land bonds under the CPI Method.

A. Overview of Consumer Price Indexes

53. Consumer price indexes serve to measure the purchasing power of a unit of currency by estimating the amount of currency that is needed to purchase a constructed basket of goods and services over time. According to the Central Bank of Peru, the Peru CPI currently covers the capital city of Lima and incorporates nearly 42,000 prices that are recorded each month from approximately 7,800 commercial establishments, 617 housing rentals, 42 markets, and six supermarkets.[51] The constructed basket includes goods such as food, beverages, clothing, fuel, appliances, and services such as electricity, water, telecommunications, transportation, healthcare, and restaurant consumption.[52] The basket (both the components and the weights assigned to each component) is updated periodically to reflect evolving preferences.

54. A CPI measures the change in the constructed basket's price relative to its price at an earlier, set point in time, with this set point in time often referred to as the "base" period. For illustrative purposes, assume that the basket of goods and services could be purchased for 10,000 Soles Oro in 1972, the assumed base year, at which point the

[51] **CE-234**, Guía Metodológica de la Nota Semanal – Inflación.

[52] **CE-234**, Guía Metodológica de la Nota Semanal – Inflación.

Peru CPI is set to equal 100. If, in 1973, 11,000 Soles Oro were needed to purchase the same basket of goods and services, then the Peru CPI would increase to 110, reflecting that the basket now costs 10 percent more in terms of Soles Oro than it had in the prior year.

55. Indexing the value of the land bonds to the Peru CPI is sensible and conceptually straightforward. By way of example, suppose that a lender extended a no-interest, one-year loan of 10,000 Soles Oro to a borrower on January 1, 1972. If, over the course of the year, prices in Peru increased by 10 percent, then when the borrower repaid the loan on January 1, 1973, the lender, receiving 10,000 Soles Oro, would have been unable to purchase as much with those 10,000 Soles Oro as he or she would have been able to purchase with 10,000 Soles Oro one year earlier. To preserve the purchasing power of the 10,000 Soles Oro lent to the borrower, the lender could have "indexed" the loan to the Peru CPI. In so doing, if prices had increased by 10 percent over the course of 1972, then the principal owed by the borrower would have also increased by 10 percent. On January 1, 1973, the borrower would have paid 11,000 Soles Oro to the lender, and the lender would have been able to purchase the same amount of goods and services as he or she would have been able to purchase with 10,000 Soles Oro on January 1, 1972.[53] The indexation of the loan to the Peru CPI would *exactly compensate* for the diminution in economic value that would have otherwise occurred due to inflation. Therefore, updating the nominal amount of the obligation based on the Peru CPI is a sensible means by which to preserve economic value in the face of inflation.

B. The Widespread Use of CPIs

56. Given the conceptual soundness of using inflation measures to maintain value, CPIs, and alternative measures of inflation (such as the Wholesale Price Index), have been used throughout Latin America to update the nominal value of payments, debts, and

[53] While loans are typically not interest-free, and the interest charged is intended, in part, to compensate the lender for the potential increase in prices over the term of the loan, the interest rate will only capture the *expected* level of inflation (conceptually, the interest rate also compensates the lender for assuming default risk and other risks). To the extent that actual inflation proves to be higher than was expected, the interest charged will not fully compensate the lender for the erosion of purchasing power due to rising prices.

assets, reflecting both the validity and the ease of implementation of such an updating method. Below, I briefly describe various instances in which Latin American governments have used CPIs or comparable inflation indices to update nominal values:

- During the late 1950s and 1960s, Chile began indexing savings to the CPI. By the 1970s, Chile was using the CPI to index tax brackets, wages, pensions, balance sheets, and profit calculations.[54]
- In the 1960s, Chile also created the Unidad de Fomento ("UF"), which is now the predominant unit of indexation used in the country today. Prices for large consumer expenditures such as houses and mortgages are often quoted in UF rather than in Chilean pesos.[55] To this day, the Chilean government provides an updated UF-peso exchange rate on a daily basis, with this exchange rate fluctuating with the CPI.[56] While purchases are made in pesos, the price in pesos on the date of purchase is determined by the UF rate. Moreover, a large proportion of debt contracts in Chile, a country that has the most advanced capital markets in the region, are denominated in UFs and thereby indexed to the CPI to preserve the real value of the obligations. Notably, such indexation is prevalent in Chile even though for many years the rate of inflation has been below 4 percent per year.[57]
- Beginning in 1964, Brazil implemented a number of indexation programs to account for inflation that had reached nearly 90 percent per year.[58] Starting in the 1960s, Brazil indexed wages, the principal of bonds, savings accounts,

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54 **CE-105**, Herrera & Valdes, *Dedollarization, Indexation and Nominalization: The Chilean Experience*, Inter-American Development Bank, July 2004, pp. 8-9, 13.

55 **CE-105**, Herrera & Valdes, *Dedollarization, Indexation and Nominalization: The Chilean Experience*, Inter-American Development Bank, July 2004, pp. 10, 16.

56 **CE-105**, Herrera & Valdes, *Dedollarization, Indexation and Nominalization: The Chilean Experience*, Inter-American Development Bank, July 2004, p. 13.

57 The Chile CPI has increased by an average of 3.3 percent annually from 2010 through 2015. **CE-239**, Federal Reserve Bank of St. Louis, Consumer Price Index: All Items for Chile.

58 **CE-50**, Fishlow, *Indexing Brazilian Style: Inflation without Tears?*, Brookings Papers on Economic Activity, 1974, pp. 262-264.

mortgages, housing rentals, the exchange rate, and fixed physical assets using the wholesale price index.[59]

- Similarly, in Colombia, the government implemented inflation indexation programs during the 1970s in order to stimulate new construction and protect savings from losses due to accelerating inflation.[60] The government subsequently offered savings accounts that were indexed to inflation to guarantee positive real returns.[61] After 1991, when Colombia's Constitutional Court was created, the Court retroactively indexed all public sector wages to inflation with the aim of paying workers based on the purchasing power of their wages.[62]

- Argentina also employed indexation in response to high rates of inflation throughout the 1970s and 1980s.[63] The government issued indexed bonds in the 1970s and subsequently indexed the official exchange rate, the prices of raw materials, and wages to inflation.[64]

- In the midst of high inflation, Mexico introduced in 1995 a credit system based on the Unidad de Inversión ("UDI"), a unit of account indexed to inflation.[65] The Bank of Mexico continues to maintain a UDI Index, setting the peso value of a UDI on a daily basis.[66]

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59 **CE-50**, Fishlow, *Indexing Brazilian Style: Inflation without Tears?*, Brookings Papers on Economic Activity, 1974, pp. 264-265.

60 **CE-85**, García García & Jayasuriya, *Courting Turmoil and Deferring Prosperity: Colombia Between 1960 and 1990*, World Bank, June 1997, p. 11.

61 **CE-85**, García García & Jayasuriya, *Courting Turmoil and Deferring Prosperity: Colombia Between 1960 and 1990*, World Bank, June 1997, p. 11.

62 **CE-146**, Steiner & Vallejo, *Colombia: A Country Study*, Library of Congress, 2010, p. 197.

63 **CE-58**, Williamson ed., *Inflation and Indexation: Argentina, Brazil, and Israel*, Institute for International Economics, March 1985, pp. 10, 15, 24.

64 **CE-58**, Williamson ed., *Inflation and Indexation: Argentina, Brazil, and Israel*, Institute for International Economics, March 1985, pp. 9-10, 24.

65 **CE-95**, Lipscomb et al., *Exchange-Rate Risk Mitigation with Price-Level-Adjusting Mortgages: The Case of the Mexican UDI*, Journal of Real Estate Research, Vol. 25, No. 1, 2003, p. 23.

66 **CE-240**, Banco de México, UDIs (Mexico's Investment Units).

57. The use of inflation indexation is also prevalent outside of Latin America. For instance, Israel enacted indexation programs in the 1940s and 1950s, issuing inflation-indexed bonds and indexing government borrowing and lending to inflation.[67] In the 1970s, Israel implemented CPI-based wage indexation, and also indexed tax brackets, insurance contracts, rental contracts, and construction projects to the CPI.[68] In addition, between the 1960s and 1980s, European countries including Denmark, Finland, France, Italy, and Sweden also implemented more limited CPI-based indexation programs.[69] And, since 1997, the U.S. Treasury has issued Treasury Inflation-Protected Securities ("TIPS"), the principal amounts of which are indexed to the CPI.[70]

58. Most pertinently, the use of the CPI and indexation has also been widespread and well-recognized in Peru:

- The Central Bank of Peru, in connection with its inflation targeting program, has issued annual inflation targets as measured by the Lima Metropolitan CPI since 1994.[71]
- Private sector companies have indexed a significant portion of the Sol-denominated debt that they have issued to the Valor Adquisitivo Constante ("VAC"), a CPI, for more than 20 years.[72] In 2000, 99 percent of outstanding Sol-denominated private sector bonds were indexed to the VAC, and 17

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67 **CE-58**, Williamson ed., *Inflation and Indexation: Argentina, Brazil, and Israel*, Institute for International Economics, March 1985, p. 67; **CE-53**, Kleiman, *Monetary Correction and Indexation: The Brazilian and Israel Experience*, National Bureau of Economic Research, 1977, p. 145; **CE-59**, Shiffer, *Adjusting to High Inflation: The Israeli Experience*, Federal Reserve Bank of St. Louis, May 1986, p. 18.

68 **CE-58**, Williamson ed., *Inflation and Indexation: Argentina, Brazil, and Israel*, Institute for International Economics, March 1985, pp. 67-60; **CE-53**, Kleiman, *Monetary Correction and Indexation: The Brazilian and Israel Experience*, National Bureau of Economic Research, 1977, pp. 148-152; **CE-59**, Shiffer, *Adjusting to High Inflation: The Israeli Experience*, Federal Reserve Bank of St. Louis, May 1986, p. 18.

69 **CE-101**, Deacon et al., *Inflation-Indexed Securities: Bonds, Swaps & Other Derivatives*, 2nd Ed., 2004, pp. 106, 119, 191, 193, 207.

70 **CE-237**, U.S. Department of the Treasury, TreasuryDirect, TIPS: FAQs.

71 **CE-149**, Armas et al., *Measurement of Price Indices Used by the Central Bank of Peru*, BIS Papers, No. 49, p. 259.

72 **CE-101**, Deacon et al., *Inflation-Indexed Securities: Bonds, Swaps & Other Derivatives*, 2d Ed., 2004, p. 216.

percent of such bonds are indexed to the VAC today.[73] In addition, government entities such as Corporación Financiera de Desarrollo SA, Peru's national development bank, have issued CPI-indexed debt since 1999.[74]

- Particularly noteworthy is that Peruvian courts, legislative bodies, and Peru's National Institute of Statistics ("INEI") have frequently used the CPI to update the value of debt obligations and other financial instruments.[75] For instance, in May 2005, the Agrarian Commission of the Peruvian Congress recommended the approval of a bill that would implement the Constitutional Tribunal's 2001 ruling mandating the CPI-based updating of the land bonds' value. The Agrarian Commission found that the "CPI is the official factor applied by the government to the national accounts," and that "judges of [Peru] rendered judgments ordering that experts update the value of the debt instruments using [the CPI]."[76] The Agrarian Commission further stated that "no public or private entity has questioned the validity of [the CPI]."[77] Moreover, according to the INEI, the CPI is a useful tool "to adjust and/or update monetary values, on the basis of the loss of purchasing power suffered by a currency over time because of inflation."[78]

59. Peru's Central Bank also publishes an price index known as "Índice de Reajuste Diario,"or "Daily Readjustment Index."[79] While I have not seen any formal documentation describing how the Daily Readjustment Index is calculated, in my experience, these indexes are derivatives of the official CPI calculation, and, as I described in the context of Chile, are used to denominate contracts such as debt. The

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73 **CE-242**, Central Reserve Bank of Peru, Table 36.

74 **CE-101**, Deacon et al., *Inflation-Indexed Securities: Bonds, Swaps & Other Derivatives*, 2d Ed., 2004, p. 216.

75 **CE-12**, Opinion issued on Draft Laws N° 578/2001-CR, N° 7440/2002-CR, N° 8988/2003-CR, N° 10599/2003-CR N° 11459/2004-CR, and N° 11971/2004-CR, p. 14.

76 *Id.*

77 *Id.*

78 **CE-236**, Peru National Institute of Statistics, Preguntas Frecuentes (Frequent Questions).

79 **CE-241**, Central Reserve Bank of Peru, Índice de Reajuste Diario.

purpose of these types of indexes is to project inflation, on a daily basis, for a given month, based on the CPI estimate from the previous month.

60. The ubiquitous use of CPIs and comparable inflation indices to update nominal values is attributable not only to the method's conceptual validity, but also to its relative simplicity, utilization of readily available data, and freedom from subjective or potentially speculative assumptions. For these reasons, it is my opinion that the value of the land bonds should be updated based on the CPI Method, using the Lima CPI.

61. Despite the widespread acceptance of CPI-based approaches to update values, the Constitutional Tribunal in its July 2013 Order criticized the use of CPI to update the value of the land bonds as follows:

> [I]n times of deep economic crisis, the CPI gets disconnected from economic reality because it stops representing what the economic agents consume or save. Thus, for example, if a certain good has its price go up by one thousand percent, what the economic agents will do is to seek alternative products or goods (so that the basket established by the CPI is no longer real), thus forming an alternative basket of products that is not reflected in the CPI. Thus, if an update were to be done based on the CPI in times of extremely high levels of inflation, this calculation would be artificial, making the original obligation impossible to be paid by the debtor. For this reason, using the CPI as [a] calculation method in the context of an economy suffering from hyperinflation is divorced from reality since it does not take into account the submerged economy, i.e., the informal economy, which normally exists at high levels in hyperinflation scenarios.[80]

62. In my opinion, the above concern is not germane here. In instances in which prices of only certain goods and services (*e.g.*, wheat) rapidly increase, then one might expect consumers to shift their consumption to other goods and services (*e.g.*, fruits and vegetables) the prices of which are not rapidly increasing. However, during the periods of pronounced inflation in Peru, prices increased *throughout* the economy. Consequently, it is not clear what types of alternative goods and services, not included in the CPI basket, that economic agents would have shifted their consumption towards, so as to preserve value during these inflationary periods.

[80] **CE-17**, Constitutional Tribunal of Peru, Ruling, July 16, 2013, ¶ 23.

63. In any event, the dollarization-based MEF Formula includes in its equations the Peru and U.S. CPIs.[81] Therefore, the MEF's approach relies upon the very same CPI measure which the Constitutional Tribunal suggested was disconnected from economic reality.

C. Updating the Value of Gramercy's Land Bonds Using the CPI Method

(1) Demonstration of the CPI Method

64. In the following discussion, I determine the updated value of a land bond under the CPI Method using Gramercy Bond No. 008615. This Class B bond has the following relevant characteristics:

- Issued in November 1972.
- Initial face value of 10,000 Soles Oro.
- Stated coupon rate of 5 percent.
- Stated term of 25 years.
- 25 total coupons, 12 of which were clipped and 13 of which are unclipped, *i.e.*, they remain outstanding.

65. **CE-120** is a photograph of the physical bond, indicating the 13 unclipped coupons that have not been paid. **Appendix I** depicts the bond's scheduled repayment structure. Of the 16,500 Soles Oro of total scheduled coupons, 7,020 Soles Oro have not been paid, and 5,200 Soles Oro of the initial face value of 10,000 Soles Oro remain outstanding.

[81] *See, e.g.*, **CE-38**, Supreme Decree N° 19-2014-EF, Annex 1 (referencing "Índice de Precios al Consumidor" with respect to both the United States and Peru).

66. Under the CPI Method, the determination of the updated value of Gramercy Bond No. 008615 can be expressed with the following equation:

A	B	C	D	E
Original Face Value	*Percent still out-standing*	*Inflation from issuance to present*	*Interest*	*Currency correction*

$$V_{Apr\ 2016}^{Soles} = F_i^{Soles\ Oro} \times \frac{u}{u+c} \times \frac{Peru\ CPI_{Apr\ 2016}}{Peru\ CPI_i} \times (1+r)^{\frac{Apr\ 2016-d}{Days\ per\ year}} \times \frac{1\ Sol}{1{,}000{,}000\ Soles\ Oro}$$

67. While this equation looks complex, it is conceptually straightforward. To update the value of the bonds, we simply multiply the original face value of the bond [A] by the percentage of the original principal that remains outstanding [B]. We then multiply that outstanding principal amount by the change in the Peru CPI between the issuance date and the present (i.e., April 30, 2016) [C]. This calculation adjusts the face value to account for Peruvian inflation, and results in an inflation-adjusted face value of the bonds in Soles Oro. We then apply an interest rate to the face value, on a compound basis, from the date of the last clipped coupon until April 30, 2016 [D]. The interest accounts for the bondholders' foregone opportunity to invest the unpaid principal and earn a return. Lastly, we convert the face value of the bonds and the interest earned from Soles Oro to the new Peruvian currency, Soles [E].

68. Examining each of the terms of the above equation in more detail:

- $V_{April\ 2016}^{Soles}$ represents the updated value of the bond in Soles as of April 30, 2016.

- $F_i^{Soles\ Oro}$ represents the initial face value of the bond in Soles Oro at *i*, the issuance date of the bond. For Gramercy Bond No. 008615, *i* is equal to November 1972 and $F_i^{Soles\ Oro}$ is equal to 10,000 Soles Oro.

- $\frac{u}{u+c}$ represents the ratio of u, the number of unclipped coupons, to $u+c$, the total number of coupons. For Gramercy Bond No. 008615, u is equal to 13, c is equal to 12, and the ratio of u to $u+c$ is equal to $\frac{13}{13+12} = 52\ percent$. This ratio is also equivalent to the proportion of the initial face value that was

outstanding at the payment date of the last clipped coupon, *i.e.*, $\frac{5{,}200\ Soles\ Oro}{10{,}000\ Soles\ Oro} = 52\ percent$. This reflects the outstanding face value.

- $\frac{Peru\ CPI_{Apr\ 2016}}{Peru\ CPI_{i}}$ represents the ratio of the Peru CPI in April 2016 to the Peru CPI in November 1972, the issuance date of the bond. The effect of this term is to adjust for the erosion of the purchasing power of a unit of Peruvian currency due to inflation. Using a base year of 1950, the Peru CPI was 604 in November 1972, meaning that prices in Peru had increased by more than six fold from 1950 to the bond's issuance date. In April 2016, the Peru CPI was 644,807,402,182.

- $(1 + r)^{\frac{Apr\ 2016 - d}{Days\ per\ year}}$ represents the annual compounding of interest at *r*, the real rate of return on debt in Peru derived in Section VI, from *d*, the payment date of the last clipped coupon, through April 30, 2016. The payment date of the last clipped coupon of Gramercy Bond No. 008615 was November 1984, 31.4 years prior to April 2016. My estimate of the real rate of return on debt in Peru—7.45 percent—is explained in Section VI.

- $\frac{1\ Sol}{1{,}000{,}000{,}000\ Soles\ Oro}$ represents the relationship between Soles Oro, a currency that is no longer in use, and Soles, the current Peruvian currency.[82]

69. In both the preceding equation and those that follow in the remainder of this report, the superscripts and subscripts of the variables denote the units and dates, respectively, of those variables.

70. Substituting the relevant characteristics of Gramercy Bond No. 008615, into the equation above yields an updated value of 53,106 Soles: [83]

$$53{,}106 = 10{,}000 \times \frac{13}{13 + 12} \times \frac{644{,}807{,}402{,}182}{604} \times (1 + .0745)^{31.4} \times \frac{1}{1{,}000{,}000{,}000}$$

[82] *See* Section III.B.

[83] The input of 31.4 years of compound interest is rounded. Therefore, calculating the bond's updated value using the inputs shown on the right-hand side of the formula will not result in the exact updated value shown on the left-hand side.

(2) Generalizability of the CPI Method

71. The CPI Method as expressed above generalizes to any bond, regardless of whether any of the scheduled coupons on the bond have been clipped. To clarify this point, if none of the coupons of Gramercy Bond No. 008615 had been clipped, then the ratio of unclipped coupons to total coupons (which is contained in term [B] of the equation provided in paragraph 66) would equal 100 percent:

$$\frac{25\ unclipped\ coupons}{25\ unclipped\ coupons + 0\ clipped\ coupons} = 100\ percent$$

72. Consequently, the initial face value of the bond would not be reduced. Similarly, if all of the bond's coupons had been clipped, then the ratio of unclipped coupons to total coupons would equal 0 percent, and the updated value of the bond would be zero:

$$\frac{0\ unclipped\ coupons}{0\ unclipped\ coupons + 25\ clipped\ coupons} = 0\ percent$$

73. Hence, in this equation, if the bond has no coupons left, its value is zero.

(3) The Updated Value of Gramercy's Land Bonds Under the CPI Method

74. Applying the CPI Method to all 9,773 land bonds in Gramercy's portfolio yields a total updated value of 5.34 billion Soles ($1.63 billion). *See* **Appendix J**.

75. As I explain above, I apply real interest only from the date of the last clipped coupon (in instances where there are no clipped coupons, this is equivalent to the date of issuance). Because the real interest rate exceeds the bonds' original nominal interest rates of 4, 5 or 6 percent, alternatively, one could instead apply the real interest rate from issuance even when some coupons were clipped. Underlying that approach is the notion that the interest payments that were made with respect to the clipped coupons did not fully compensate for the value of the expropriated land, and therefore, that the updated value of the bonds should include compensation for this previous underpayment. For the purposes of this analysis, I conservatively choose the former approach and ascribe no value relating to this underpayment of interest.

76. While the CPI Method is the most conceptually valid and readily implementable means by which to update the value of the land bonds, I understand that the MEF has proposed the use of a dollarization-based approach. I consequently turn now to a discussion of such a method, which, if correctly implemented and subject to the reliability of certain assumptions, should yield results that are comparable to those yielded by the CPI Method.

V. THE DOLLARIZATION METHOD

A. Overview of Dollarization

77. In contrast to the CPI Method, which relies directly on the changes in the purchasing power of a local currency (here, the Peruvian currency) as measured by the relevant CPI, a dollarization-based method would entail: (1) the conversion of the bond at its issuance date from the local currency to U.S. dollars, (2) the adjustment of that U.S. dollar amount for inflation experienced in the United States, (3) the accrual of real interest on that inflation-adjusted, U.S. dollar amount at the real return on debt in Peru (*i.e.*, even though the debt is converted to dollars, a real Peruvian return is still appropriate given that the investors, who were largely based in Peru, would be expected to have made investments in Peru), and (4) the conversion of the bond from U.S. dollars back to the local currency at the time of payment (collectively, the "Dollarization Method"). Thus, the Dollarization Method differs from the CPI Method in that the bond is converted from the Peruvian currency to U.S. dollars at the issuance date, the inflation adjustment is consequently made based on U.S., rather than Peru, inflation, and the bond is converted back to the Peruvian currency at the present day.

78. However, despite these differences, in theory, the Dollarization Method shares the same fundamental objective as the CPI Method—to account for the decrease in purchasing power of a given currency due to inflation and the opportunity cost associated with not having received payment. Given this common objective, it stands to reason that the results of the Dollarization Method should approximate the results of the CPI Method.

79. In this section, I first demonstrate that the Constitutional Tribunal's stated belief that the Dollarization Method would yield lower updated values than would the CPI Method is generally unfounded because, if properly executed, the Dollarization Method parallels the CPI Method. Second, I explain the concept of a "parity exchange rate," which is a key input in the Dollarization Method. Third, I estimate the updated value of Gramercy's portfolio of land bonds under a conceptually sound Dollarization Method. Finally, I discuss the ways in which the MEF has incorrectly specified the Dollarization Method, as well as the erroneous updated values that result from this misguided specification.

B. The Algebraic Equivalence of the Dollarization Method and the CPI Method

80. To gain insight into the relationship between the Dollarization Method and the CPI Method, consider the following three hypothetical scenarios regarding inflation in Peru and the United States. For simplicity, in each of these scenarios, I have assumed counterfactually that the Peruvian currency at all times was the Soles Oro, and have also left aside the accrual of interest at the real rate of return on debt in Peru (the third step described above). Finally, I assume that the exchange rates are in parity. I further explain this concept of parity below.

Scenario 1: No inflation in either Peru or the United States

81. Begin with the presumption that, from the time a land bond was issued through the present, there was no inflation in either Peru or the United States.

82. Recall that, under the CPI Method, the initial face value of a bond is multiplied by the change in the Peru CPI from the issuance date through the present to account for the effect of inflation. Consider again Gramercy Bond No. 008615, which had an initial face value of 10,000 Soles (in reality, 10,000 Soles Oro) at its issuance in 1972. If there had been no change in the Peru CPI from 1972 through the present, then the bond's inflation-adjusted face value would remain at 10,000 Soles. Algebraically, this can be expressed as:

$$\textbf{(1)}\ F_{2016}^{Soles} = F_{1972}^{Soles}$$

83. Under the Dollarization Method, the initial face value of the bond is first converted at the date of issuance from Soles to U.S. dollars, and this U.S. dollar amount is adjusted to maintain purchasing power given the effect of inflation in the United States. Algebraically, the U.S. dollar-equivalent face value of the bond at the issuance date, $F_{1972}^{\$}$, can be expressed in terms of its Sol-denominated face value at the issuance date, F_{1972}^{Soles}, and the official Sol-U.S. dollar exchange rate[84] at the issuance date, $Q_{1972}^{Soles/\$}$:

(2) $F_{1972}^{\$} = \frac{F_{1972}^{Soles}}{Q_{1972}^{Soles/\$}}$

84. Further, under the Dollarization Method the updated face value of the bond in today's Soles, $F_{2016}^{DM,Soles}$, can be expressed algebraically as the product of the bond's face value in today's U.S. dollars, $F_{2016}^{\$}$, and the current Sol-U.S. dollar official exchange rate, $Q_{2016}^{Soles/\$}$:

(3) $F_{2016}^{DM,Soles} = F_{2016}^{\$} \times Q_{2016}^{Soles/\$}$

85. In addition, given that there is assumed to have been no inflation in the United States, the face value today in U.S. dollars is the same as the face value at the issuance date in U.S. dollars, *i.e.*, $F_{2016}^{\$} = F_{1972}^{\$}$. As it is also assumed that there has been no inflation in Peru, the official Sol-U.S. dollar exchange rate is expected to remain constant over time, *i.e.*, $Q_{2016}^{Soles/\$} = Q_{1972}^{Soles/\$}$. Thus, **Equation 3** can be rewritten as:

(4) $F_{2016}^{DM,Soles} = F_{1972}^{\$} \times Q_{1972}^{Soles/\$}$

86. Finally, substituting **Equation 2** into **Equation 4** yields:

(5) $F_{2016}^{DM,Soles} = \frac{F_{1972}^{Soles}}{Q_{1972}^{Soles/\$}} \times Q_{1972}^{Soles/\$}$

[84] I use the term "official exchange rate" to mean the exchange rate that was either set (when the exchange rate between the Peruvian currency and the U.S. dollar was fixed) or prevailing in the market (when the exchange rate between the Peruvian currency and the U.S. dollar was floating).

87. The $Q_{1972}^{Soles/\$}$ terms cancel out of **Equation 5**, and the Dollarization Method therefore reduces to the following:

(6) $F_{2016}^{DM,Soles} = F_{1972}^{Soles}$

88. Under the Dollarization Method, the bond's updated face value today in Soles is identical to the bond's initial face value in Soles at the issuance date. Consequently, under the assumption that there has been no inflation in Peru or the United States from the issuance date of the bond to the present, the Dollarization Method and the CPI Method yield the same result (**Equations 1** and **6** are equivalent).

Scenario 2: Inflation in Peru, no inflation in the United States

89. Now, suppose that there has been inflation in Peru, but not in the United States. Under the CPI Method, the 10,000 Sol initial face value of Gramercy Bond No. 008615 is updated to account for cumulative inflation in Peru from the issuance date to the present (π^{Peru}), which can be expressed algebraically as follows:

(7) $F_{2016}^{Soles} = F_{1972}^{Soles} \times (1 + \pi^{Peru})$

90. Under the Dollarization Method, the 10,000 Sol initial face value of the bond is again converted from Soles to U.S. dollars at the issuance date, as in **Equation 2**. Given that, in this second scenario, it is still assumed that there has been no inflation in the United States, the U.S. dollar-equivalent face value does not need to be adjusted to reflect U.S. inflation, and therefore $F_{2016}^{\$} = F_{1972}^{\$}$. As in the first scenario, the U.S. dollar-equivalent face value at the present day is converted back to Soles at the current official exchange rate, as in **Equation 3**. However, unlike the first scenario, the current official exchange rate will differ from the official exchange rate at the issuance date, as prices have increased in Peru. The current official exchange rate would be expected to have increased from the issuance date to the present by the cumulative inflation in Peru (assuming parity). Algebraically:

(8) $Q_{2016}^{Soles/\$} = Q_{1972}^{Soles/\$} \times (1 + \pi^{Peru})$

91. Thus, **Equation 3** can be restated as:

$$\textbf{(9)}\ F_{2016}^{DM,Soles} = F_{1972}^{\$} \times Q_{1972}^{Soles/\$} \times (1 + \pi^{Peru})$$

92. Substituting **Equation 2** into **Equation 3** yields:

$$\textbf{(10)}\ F_{2016}^{DM,Soles} = \frac{F_{1972}^{Soles}}{Q_{1972}^{Soles/\$}} \times Q_{1972}^{Soles/\$} \times (1 + \pi^{Peru})$$

93. The $Q_{1972}^{Soles/\$}$ terms cancel out of **Equation 10,** and the Dollarization Method therefore reduces to the following:

$$\textbf{(11)}\ F_{2016}^{DM,Soles} = F_{1972}^{Soles} \times (1 + \pi^{Peru})$$

94. Thus, under the Dollarization Method, the bond's updated face value today in Soles is equal to the bond's initial face value in Soles at the issuance date adjusted for cumulative inflation in Peru from the issuance date to the present. Consequently, under the assumption that there has been inflation in Peru but no inflation in the United States, the equivalence of the Dollarization Method and the CPI Method persists (**Equations 7** and **11** are equivalent).

Scenario 3: Inflation in both Peru and the United States

95. Consider now a third scenario in which it is assumed that both Peru and the United States have experienced inflation, albeit at different rates. As the CPI Method incorporates only the effect of inflation in Peru, the assumption of inflation in the United States does not bear on this method, and **Equation 7** remains the appropriate expression of the bond's updated face value under the CPI Method.

96. In contrast, the assumption of inflation in the United States does bear on the Dollarization Method. Recall that, in the two previous scenarios in which it was assumed that the United States has not experienced inflation, the face value of the bond in U.S dollars at the present day, $F_{2016}^{\$}$, was equivalent to the face value of the bond in U.S. dollars at the issuance date, $F_{1972}^{\$}$. In other words, given that prices in the United States did not change, the face value of the bond remained constant over time. However, in the current scenario, this equality no longer holds. As prices in the United States are now assumed to have increased over time, the U.S. dollar-equivalent face value of the bond at the issuance date must be adjusted in order to

preserve its value. Consequently, the face value of the bond in today's U.S. dollars will be a function of both (1) the face value of the bond in U.S. dollars at the issuance date, *and* (2) cumulative inflation in the United States. Algebraically:

(12) $F_{2016}^{\$} = F_{1972}^{\$} \times (1 + \pi^{US})$

97. Additionally, in this third scenario, assuming parity, the Sol-U.S. dollar official exchange rate would change from the issuance date to the present day by both the cumulative amount of inflation experienced in Peru and the cumulative amount of inflation experienced in the United States. Algebraically:

(13) $Q_{2016}^{Soles/\$} = Q_{1972}^{Soles/\$} \times \frac{1+\pi^{Peru}}{1+\pi^{US}}$

98. Hence, the updated face value of the bond in Soles under the Dollarization Method can be expressed as:

(14) $F_{2016}^{DM,Soles} = \frac{F_{1972}^{Soles}}{Q_{1972}^{Soles/\$}} \times (1 + \pi^{US}) \times Q_{1972}^{Soles/\$} \times \frac{1+\pi^{Peru}}{1+\pi^{US}}$

99. Two terms, $Q_{1972}^{Soles/\$}$ and $(1 + \pi^{US})$, cancel out of **Equation 14**, and the Dollarization Method therefore reduces to:

(15) $F_{2016}^{DM,Soles} = F_{1972}^{Soles} \times (1 + \pi^{Peru})$

100. Under the Dollarization Method, the bond's updated face value today in Soles is equal to the bond's initial face value in Soles at the issuance date adjusted for cumulative inflation in Peru from the issuance date to the present. Consequently, under the assumption that there has been inflation in both Peru and the United States, an assumption which of course reflects reality, the equivalence of the Dollarization Method and the CPI Method persists (**Equations 7** and **15** are equivalent).

101. The three hypothetical examples above serve to illustrate the equivalence of the CPI Method and the Dollarization Method across three states of the world: the first in which there has been no inflation in either Peru or the United States, the second in which there has been inflation in Peru but not in the United States, and the third in which there has been inflation in both Peru and the United States.

102. As mentioned above, this equivalence only holds under the assumption that relative exchange rate parity holds. This means that that the official exchange rate between the Peruvian currency and the U.S. dollar evolves in lockstep with the differential between the cumulative inflation in both countries. In other words, the official exchange rate changes such that the purchasing power of one currency continues to equate to that of the other.[85] If this condition does not hold, then the terms $Q_{1972}^{Soles/\$}$and $(1 + \pi^{US})$ do not cancel out from the Dollarization Method formula expressed in **Equation 14**. As a result, **Equation 14** does not reduce exactly to the CPI Method formula expressed in **Equation 7**, and the updated face values yielded by the two methods will differ. It is not possible to know, *a priori*, the direction or magnitude of the difference between the two updated face values.

103. An important implication of the foregoing discussion is that converting the initial face value of a land bond to U.S. dollars at the issuance date using the official exchange rate at that time may distort the U.S. dollar-equivalent values. This may result from a number of factors, including trade restrictions, high inflation, and exchange rate controls.[86] These exchange rate distortions can be particularly severe when the official exchange rate is pegged (or fixed) and when inflation is high, which was true with respect to the Sol Oro-U.S. dollar official exchange rate and Peru, respectively, during much of the 1960s and 1970s.

104. This issue may be addressed by calculating what is known as a "parity" exchange rate, rather than the official exchange rate, to make the initial conversion. I now discuss the concept of parity exchange rates, and address the appropriate means by which to estimate parity exchange rates in Section V.D below.

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[85] This relationship is commonly referred to as the purchasing power parity theory of exchange rates. *See, e.g.*, **CE-62**, Frenkel, *The Collapse of Purchasing Power Parities During the 1970s*, European Economic Review, 1981, pp. 217, 226, 233; **CE-52**, Frenkel, *A Monetary Approach to the Exchange Rate: Doctrinal Aspects and Empirical Evidence*, Scandinavian Journal of Economics, Vol. 78, No. 2, June 1976, p. 201; **CE-61**, Edwards, *Real Exchange Rates, Devaluation, and Adjustment: Exchange Rate Policy in Developing Countries*, 1989, pp. 2-84.

[86] *See, e.g.*, **CE-61**, Edwards, *Real Exchange Rates, Devaluation, and Adjustment: Exchange Rate Policy in Developing Countries*, 1989, pp. 2-84.

C. The Concept of Parity Exchange Rates

105. When the official exchange rate changes only as a result of changes in relative inflation rates between two countries, the official exchange rate is considered to be at parity. Consider the evolution of the Sol-U.S. dollar official exchange rate over time. As a starting point in time, take, for instance, December 1995, when the observed official exchange rate was 2.33 Soles per U.S. dollar, the Peru CPI was 314,605,594,210 and the U.S. CPI was 638.[87] In April 2016, the Peru CPI was 644,807,402,182 and the U.S. CPI was 994. Under **Equation 13**, which specifies the relationship between official exchange rates and relative inflation in the two countries, the official exchange rate in April 2016 would be expected to be to be 3.07 Soles per U.S. dollar:

$$\frac{3.07\ Soles}{\$1} = \frac{2.33\ Soles}{\$1} \times \frac{\frac{644{,}807{,}402{,}182}{314{,}605{,}594{,}210}}{\frac{994}{638}}$$

106. That is, if the official exchange rate in April 2016 were in fact 3.07 Soles per U.S. dollar, then the exchange rate would be said to have remained at parity, and would indicate that, in April 2016, the baskets of Peruvian and U.S. goods and services that could be purchased would be in the exact same proportion as they had been in December 1995.

107. However, the official exchange rate in April 2016 was actually 3.30 Soles per U.S. dollar, and not 3.07 Soles per U.S. dollar. At this observed official exchange rate, the Sol was undervalued vis-à-vis the U.S. dollar with respect to the parity condition corresponding to the assumed base period of December 1995. It is likely that the April 2016 Sol-U.S. dollar official exchange rate differed from the estimated parity exchange rate due to factors such as changes in the terms of trade (mostly commodity prices), transportation costs, tariff regimes, local demand and supply conditions, and

[87] As elsewhere in this report, the reported U.S. CPI values are based on an assumed base year of 1950, at which point the U.S. CPI is set to 100.

certain differences in worker productivity between countries (often referred to as the Balassa-Samuelson effect[88]).

108. As noted, departures of an official exchange rate from the corresponding parity exchange rate tend to be particularly pronounced when the official exchange rate is fixed, rather than floating or market-determined, and when inflation is severe in one or both of the countries. Both of these conditions applied during much of the period during which the land bonds were issued. In such circumstances, the official exchange rate cannot simply be assumed to equilibrate the purchasing power of the two currencies under consideration.

D. Estimating Parity Exchange Rates

109. The first step in estimating a parity exchange rate is determining the appropriate base period. In the example presented above in Section V.C, the base period was assumed to be December 1995, and the April 2016 parity exchange rate was estimated with respect to that base period. However, in application, it is problematic to use a single month or even a single year as the base period. Thus, common practice is to use a span of multiple years as the base period, premised on the view that the observed official exchange rate over the period is, "on average," during that particular period, equivalent to the parity exchange rate. The selected period should correspond to relatively "normal" years during which the two countries experienced fairly low and stable inflation and did not undergo any major economic or political changes, and when their external accounts exhibited reasonable (or sustainable) balances.

110. To estimate the parity exchange rate of the Peruvian currency to the U.S. dollar in each year from 1970 through 1981, the years during which Peru issued the land bonds now held by Gramercy, I have selected the years 1999 through 2015 as the base period. In my opinion, it is reasonable to assume that the official exchange rates in these years tended toward parity given that, during this period, the Peruvian economy was both stable and relatively liberalized with, for instance, a floating exchange rate,

[88] **CE-46**, Balassa, *The Purchasing Power Parity Doctrine: A Reappraisal*, Journal of Political Economy, Vol. 72, 1964, p. 586; **CE-45**, Samuelson, *Theoretical Notes on Trade Problems*, Review of Economics and Statistics, Vol. 46, No. 2, 1964, pp. 145-154.

low levels of inflation, and relatively few economic controls. I also reviewed Peru's current account balance to evaluate the relative stability and sustainability of Peru's external sector. Prior to 1999, Peru ran large current account deficits. Such deficits were frequently over 6 percent of GDP and fluctuated significantly year-to-year. Since 1999, Peru's current account deficits stabilized, averaging a 1.7 percent of GDP. [89] Peru's small and stable current account deficits over the 1999 to 2015 period suggest that Peru's exchange rates over these years likely tended towards parity; therefore this period serves as a reasonable base period.

111. **Appendix K** shows the official exchange rate and my derived parity exchange rate in each month between January 1970 and April 2016. Due to inflation in Peru, both the official exchange rate and my derived parity exchange rate increase significantly over the period. So that the rapidly increasing rates can fit on one chart, I present the y-axis on a logarithmic scale. The rates shown on the chart are the actual exchange rates, but the scale of the y-axis does not increase in a linear fashion.

112. To describe my calculation, I focus on the derivation of the November 1972 parity exchange rate. For each month during the assumed base period of 1999 through 2015, I divide the official exchange rate in that base period month (expressed in Soles Oro per U.S. dollar) by the ratio of the change in the Peru CPI to the change in the U.S. CPI from November 1972 to that base period month. Because there are 204 months during this base period, I calculate 204 separate estimates of the November 1972 parity rate.

113. Thus, first, I estimate the November 1972 parity rate by taking the observed official exchange rate in January 1999; I divide that by the ratio of the change in Peru and U.S. inflation from November 1972 to January 1999. This gives me one estimate of the November 1972 parity rate. Then I do the same, using February 1999 – I divide the February 1999 official exchange rate by the ratio of the change in Peru and U.S. inflation from November 1972 to February 1999. This gives me a second estimate of

[89] **CE-249**, Central Reserve Bank of Peru, Table 88.

the November 1972 parity rate. I do this 202 more times, using each month in the base period.

114. Ultimately, this gives me 204 estimates of the November 1972 parity rate; I take the average of these and derive an estimated parity exchange rate in November 1972 of 18.41 Soles Oro per U.S. dollar. As shown on **Appendix K**, this estimated parity exchange rate is below the official exchange rate in the 1970s and 1980s, which is conceptually reasonable, as this was a period of economic turmoil and government intervention in the market in Peru. The estimated parity exchange rate then converges with the official exchange rate during the 1990s and 2000s when the Peruvian economy was liberalized. The estimated parity exchange rates at the issuance dates of the bonds, as calculated above, are inputs to an appropriate specification of the Dollarization Method, which I further describe below.

115. Finally, as I discuss further in Section V.F, the dollarization-based MEF Formula reflects consideration of these issues. In particular, the MEF Formula recognizes that, given the economic distortions that existed during the time the land bonds were issued, the initial face value of the bonds should be converted to U.S. dollars at parity exchange rates rather than the observed official exchange rates. The MEF Formula also indicates that the parity exchange rates should be estimated using a multi-year base period. However, as I will demonstrate, the MEF Formula errs severely in its estimation of parity exchange rates, yielding results that make no sense, have no basis in fact or economic theory, and are arbitrarily low.

E. Updating the Value of Gramercy's Land Bonds Under the Dollarization Method

(1) Demonstration of the Dollarization Method

116. In the following discussion, I consider again Gramercy Bond No. 008615, this time to illustrate the Dollarization Method. As previously mentioned, this Class B bond has the following relevant characteristics:

- Issued in November 1972.
- Initial face value of 10,000 Soles Oro.
- Stated coupon rate of 5 percent.

- Stated term of 25 years.
- 25 total coupons, 12 of which were clipped and 13 of which are unclipped, *i.e.*, outstanding.

117. Under the Dollarization Method, the determination of the updated value of Gramercy Bond No. 008615 can be expressed with the following equation:

A	B	C	D	E
Original face value converted to USD	*Percent still out-standing*	*U.S. inflation from issuance to present*	*Interest*	*Official exchange rate*

$$V_{Apr\ 2016}^{Soles} = \frac{F_i^{Soles\ Oro}}{P_i^{Soles\ Oro/\$}} \times \frac{u}{u+c} \times \frac{U.S.CPI_{Apr\ 2016}}{U.S.CPI_i} \times (1+r)^{\frac{Apr\ 2016-d}{Days\ per\ year}} \times Q_{Apr\ 2016}^{Soles/\$}$$

118. This formula looks complex, and it has more steps than the CPI Method's formula, but it, too, is conceptually fairly straightforward. To update the value of the bonds, we first convert the original face value of the bonds at issuance to U.S. dollars by dividing by the Soles-U.S. dollar parity exchange rate at issuance [A]. We then multiply by the percentage of the original face value that remains outstanding [B]. Next, we multiply the outstanding principal by the change in the U.S. CPI between the issuance date and April 2016 [C], which yields a U.S.-inflation-adjusted face value of the bonds. We then apply an interest rate to the inflation-adjusted face value, compounded, from the date of the last clipped coupon until April 30, 2016 [D]. The interest accounts for the bondholders' foregone opportunity to invest the unpaid principal and earn a return in Peru. Lastly, we convert the face value of the bonds and the interest earned from U.S. dollars back into Soles by multiplying by the April 2016 Soles-U.S. dollar official exchange rate [E].

119. Examining each of the terms of the above equation in turn:

- $V_{Apr\ 2016}^{Soles}$ represents the updated value of the bond in Soles as of April 2016.

- $F_i^{Soles\ Oro}$ represents the initial face value of the bond in Soles Oro at *i*, the issuance date of the bond. For Gramercy Bond No. 008615, *i* is equal to November 1972 and $F_i^{Soles\ Oro}$ is equal to 10,000 Soles Oro. Under the Dollarization Method, the initial face value of the bond is converted to U.S. dollars at $P_i^{Soles\ Oro/\$}$, the estimated parity exchange rate on the issuance date. For Gramercy Bond No. 008615, this parity exchange rate is equal to 18.41 Soles Oro per U.S. dollar, as discussed previously.

- $\frac{u}{u+c}$ represents the ratio of *u*, the number of unclipped coupons, to $u + c$, the total number of coupons. For Gramercy Bond No. 008615, *u* is equal to 13, c is equal to 12, and the ratio of *u* to $u + c$ is equal to $\frac{13}{13+12} = 52\ percent$. This ratio is also equivalent to the proportion of the initial face value that was outstanding at the payment date of the last clipped coupon, *i.e.*, $\frac{5{,}200\ Soles\ Oro}{10{,}000\ Soles\ Oro} = 52\ percent$. This reflects the outstanding face value.

- $\frac{U.S.CPI_{Apr\ 2016}}{U.S.\ CPI_i}$ represents the ratio of the U.S. CPI in April 2016 to the U.S. CPI in November 1972, the issuance date of the bond. The effect of this term is to adjust for the erosion of the purchasing power of a U.S. dollar due to inflation. Using a base year of 1950, the U.S. CPI was 176 in November 1972 and 994 in April 2016.

- $(1 + r)^{\frac{Apr\ 2016 - d}{Days\ per\ year}}$ represents the annual compounding of interest at *r*, the real rate of return on debt in Peru, from *d*, the payment date of the last clipped coupon, through April 2016. The payment date of the last clipped coupon of the bond was November 1984, 31.4 years prior to April 2016. The real rate of return on debt in Peru is estimated as 7.45 percent, as discussed in Section VI.

- $Q_{Apr\ 2016}^{Soles/\$}$ represents the official Sol-U.S. dollar exchange rate in April 2016 at which the updated value is converted from U.S. dollars to Soles. In light of the relatively liberalized and stable state of the Peruvian economy since the early 1990s, it is reasonable to assume that the official exchange rate in recent periods has approximated the parity exchange rate. Consequently, while the initial face value of the bond is converted to U.S. dollars at an estimated parity exchange rate at the issuance date, the adjusted value is converted back to U.S. dollars at the current official exchange rate. This conversion of the adjusted value back to U.S. dollars at the current official exchange rate is consistent with the MEF Formula, which I discuss below in Section V.F. I rely on the official Sol-U.S. dollar exchange rate on April 30, 2016, which was 3.29.

120. Substituting the relevant characteristics of Gramercy Bond No. 008615 into the equation above yields an updated value of 50,112 Soles: [90]

$$50{,}112 = \frac{10{,}000}{18.41} \times \frac{13}{13+12} \times \frac{994}{176} \times (1+.0745)^{31.4} \times 3.29$$

121. As with the formulation of the CPI Method, this formulation of the Dollarization Method generalizes to any bond, regardless of whether any of the scheduled coupons on the bond have been clipped. The results under the CPI Method, while not exactly identical to the Dollarization Method, are very similar.

(2) The Updated Value of Gramercy's Land Bonds Under the Dollarization Method

122. Applying the Dollarization Method to all 9,773 land bonds in Gramercy's portfolio yields a total updated value of 5.04 billion Soles ($1.53 billion). This amount is similar to the total updated value yielded under the CPI Method of 5.34 billion Soles ($1.63 billion). *See* **Appendix L**.

F. The MEF's Specification of the Dollarization Method

123. In this section, I discuss the dollarization-based approach as specified under the MEF Formula. Importantly, the MEF Formula diverges from the appropriate implementation of the Dollarization Method discussed above in four key respects:

- Under the MEF Formula, the derivation of the parity exchange rate (the "MEF parity exchange rate") used to convert the face value of a bond is severely flawed.
- Under the MEF Formula, interest is accrued at an arbitrary, low rate.
- Under the MEF Formula, interest accrues through only December 2013, and U.S. dollars are converted back to Soles at the official December 2013 exchange rate.

[90] The input of 31.4 years of compound interest is rounded. Therefore, calculating the bond's updated value using the inputs shown on the right-hand side of the formula will not result in the exact updated value shown on the left-hand side.

- Under the MEF Formula, the value of the bond is only updated to account for inflation from the date of the first unpaid coupon, not from issuance.

124. As a result of these disparities, the MEF Formula yields updated values that are wholly divorced from those produced under a conceptually valid dollarization-based method. Consequently, the MEF Formula dramatically underestimates the updated value of a bond relative to both the CPI Method and a reasonable implementation of the Dollarization Method.

125. The MEF Formula takes the following algebraic form:

A	B	C
Outstanding face amount converted to USD at MEF parity exchange rate	*Interest*	*Official exchange rate*

$$V_{2013}^{Soles} = \frac{F_d^{Soles\ Oro}}{P_d^{"Soles\ Oro/\$"}} \times \prod_d^{2013} (1 + y_t) \times Q_{2013}^{Soles/\$}$$

126. Examining each of the terms of the MEF Formula in turn:

- V_{2013}^{Soles} represents the updated value of the bond in Soles as of 2013.
- $F_d^{Soles\ Oro}$ represents the outstanding face value of the bond in Soles Oro at *d*, the payment date of the last clipped coupon, and at issuance date for unclipped bonds. For Gramercy Bond No. 008615, *d* is equal to November 1985 and $F_d^{Soles\ Oro}$ is equal to 5,200 Soles Oro. Under the MEF Formula, the initial face value of the bond is converted to Soles Oro at $P_d^{"Soles\ Oro/\$"}$, the MEF parity exchange rate. However, as I will explain below, the MEF parity exchange rate differs drastically from what is commonly understood in economics as the "parity exchange rate."[91]

[91] *See, e.g.*, **CE-61**, Edwards, *Real Exchange Rates, Devaluation, and Adjustment: Exchange Rate Policy in Developing Countries*, 1989, pp. 2-84; **CE-75**, Williamson ed., *Estimating Equilibrium Exchange Rates*, Institute for International Economics, September 1994, pp. 61-131; **CE-78**, Taylor, *The Economics of Exchange Rates*, Journal of Economic Literature, Vol. 33, No. 1, March 1995, p. 19.

- $\prod_{d}^{2013}(1 + y_t)$ represents the annual compounding of interest from d, the payment date of the first unclipped coupon, to 2013 at y_t, a series of 1-year U.S. Treasury bill yields. This is equivalent to our application of a real rate of interest (however, we use the real return on debt in Peru).

- $Q_{Dec\ 2013}^{Soles/\$}$ represents the official Sol-U.S. dollar exchange rate in 2013 at which the updated value is converted from U.S. dollars to Soles.

127. Substituting the relevant characteristics of Gramercy Bond No. 008615 into the equation above yields an updated value, as of 2013, of less than 0.01 Soles: [92]

$$0.01 = \frac{10{,}000 \times \frac{13}{13 + 12}}{6{,}934{,}210} \times 3.28 \times 2.70$$

128. While the MEF Formula ostensibly incorporates all of the individual necessary elements of a dollarization-based method, as I will discuss in detail below, both the calculation of the MEF parity exchange rate and the use of the yields on 1-year U.S. Treasury bills are arbitrary and indefensible.

(1) The Erroneous Estimate of the Parity Exchange Rate

129. Under the MEF Formula, the MEF parity exchange rate for a given year d, P_d, is calculated as follows:

$$P_d^{"Soles\ Oro/\$"} = Q_d^{Soles\ Oro/\$} \times \frac{Peru\ CPI_d}{U.S.CPI_d} \times \frac{1}{e^{\$/Sol\ Oro}}$$

130. This formulation of the parity exchange rate has three elements:

- $Q_d^{Soles\ Oro/\$}$, the official exchange rate in a given year, say 1972.

- $\frac{Peru\ CPI_d}{U.S.CPI_d}$, the ratio of the Peru CPI to the U.S. CPI in 1972, where each CPI is set to 100 in the assumed base year of 1950.

- $\frac{1}{e^{\$/Sol\ Oro}}$, or 1 divided by what the MEF refers to as the "real exchange rate."

[92] 3.28 represents the cumulative compound interest between 1985, the year of the last clipped coupon, and 2013. The U.S. Treasury rate ranges from under 1 percent to over 8 percent over that period.

131. Before I delve into the MEF's so-called "real exchange rate," the application of which serves no discernible economic purpose, I note that even at this high level, the MEF's parity formula is misguided.

132. Recall from our discussion of parity exchange rates above that the estimation of a parity exchange rate is fairly straightforward. First, one must select a time period during which the official exchange rate can be reasonably assumed to be at parity; then, apply the relative changes in inflation from that time period to the time period of interest (here, the date of issuance) to arrive at an estimate of the parity rate as of that date.

133. The MEF Formula, taken as a whole, is a completely nonsensical construction that results in economically unreasonable results.

134. The first term of the MEF Formula is the official Soles-U.S. dollar exchange rate in a given year, and the second term is the inflation differential in Peru and the U.S. between 1950 and that selected year. For example, if 1972 is the year for which we are attempting to estimate the parity exchange rate, under the MEF formula, the first term is the official exchange rate in 1972. That official exchange rate is multiplied by the second term, which is the change in the Peru CPI between 1972 and 1950, divided by the change in the U.S. CPI between 1972 and 1950.

135. However one interprets the MEF Formula, it makes no sense. For instance, if the MEF believes that the official exchange rate in 1950 was at parity but the 1972 official exchange rate was not, then, as we have discussed, the math is simple—the MEF formula should start with the official exchange rate in 1950, not 1972, and apply the change in inflation in both countries to that rate, in order to arrive at an estimate of the parity rate in 1972. There would be no reason to start with the official exchange rate in 1972.

136. Alternatively, if the MEF believes that the 1972 official rate is at parity, then no adjustment should be necessary, and the application of changes in Peru and U.S. inflation from 1950 to 1972 will distort the previously correct 1972 rate. The reason for this is straightforward—if the official exchange rate is at parity in 1972, then the 1972 official exchange rate already takes into account inflation in the two countries

between 1950 and 1972. The second term applies the inflation differential in the two countries between 1950 and 1972 to the 1972 exchange rate, a rate which is already at parity, and therefore already accounts for that inflation differential. It is as if the MEF is double counting inflation between 1950 and 1972, yielding a meaningless result.

137. If the MEF believes that neither the 1950 nor the 1972 exchange rate are at parity, there is no reason whatsoever to expect that by multiplying the official exchange rate in 1972 by the change in inflation in Peru and in the U.S. between 1950 and 1972, one would arrive at a 1972 parity rate; the result is, again, meaningless.

138. In short, I can find no reasonable economic interpretation of these first two terms of the MEF's "parity exchange rate" formula.

139. Let's now consider the third term and examine whether it serves any purpose and whether it can undo the mistake in the first two terms of the equation. In short, the answer is no. This third term, 1 divided by what the MEF calls the "real exchange rate," is entirely nonsensical and only compounds the problems within the MEF formula. [93]

140. Recall from the equation above that the MEF multiplies the first two terms by 1 divided by a "real exchange rate," which the MEF calculates as follows:

$$e^{\$/Sol\ Oro} = Average\left(\frac{Peru\ CPI_t}{U.S.CPI_t \times Q_t^{Soles\ Oro/\$}}\right)$$

141. Thus, the third term of the MEF's parity rate formula looks like this:

$$\frac{1}{Average\left(\frac{Peru\ CPI_t}{U.S.CPI_t \times Q_t^{Soles\ Oro/\$}}\right)}$$

142. As discussed, the first term of the MEF parity exchange rate formula is *already* an official exchange rate. The third term of the MEF formula simplifies to *another*

[93] For an in-depth treatment of real exchange rates, *see* **CE-61**, Edwards, *Real Exchange Rates, Devaluation, and Adjustment: Exchange Rate Policy in Developing Countries*, 1989, pp. 2-84.

exchange rate multiplied by a CPI differential (as illustrated in more detail below). Therefore, by including both the first term and the third term, which each include exchange rates, the MEF creates a nonsensical result where the parity exchange rate is equal to the official exchange rate (*e.g.*, 1972) multiplied by the average of the official exchange rate over a range of years (*e.g.*, from 1950 to present).

143. There is no basis in economics that I am aware of that would explain or justify this approach. Again, recall from the earlier discussion of parity exchange rates that, rather than choosing one base period, we might choose a timeframe to use as the base period for a parity rate calculation. In my description of an appropriate derivation of a parity rate, I used 1999 to 2015. As I described, one then estimates the parity rate for, say, November 1972 using each month during the base period, and then takes the average of those 204 estimates for November 1972. But there is no reason why one would then *multiply* that average by the official exchange rate in 1972.

144. Another way of illustrating this critical error is to consider the entire MEF parity exchange rate formula:

$$P_d^{"Soles\ Oro/\$"} = Q_d^{Soles\ Oro/\$} \times \frac{Peru\ CPI_d}{U.S.CPI_d} \times \frac{1}{Average\left(\frac{1}{Q_t^{Soles\ Oro/\$}} \times \frac{Peru\ CPI_t}{U.S.CPI_t}\right)}$$

145. If we simplify this calculation by assuming, for the moment, that inflation in the U.S. and in Peru were exactly equal at all times, then those ratios reduce to 1, and the equation can be simplified to the following:

$$P_d^{"Soles\ Oro/\$"} = Q_d^{Soles\ Oro/\$} \times \frac{1}{\frac{1}{Q_t^{Soles\ Oro/\$}}}$$

146. And, finally:

$$P_d^{"Soles\ Oro/\$"} = Q_d^{Soles\ Oro/\$} \times Q_t^{Soles\ Oro/\$}$$

147. Thus, while the MEF parity exchange rate should be expressed as a certain number of Soles Oro per U.S. dollar—which is, of course, the definition of an exchange rate between the two currencies— the right-hand side of the equation is, nonsensically, expressed in terms of the Soles Oro per U.S. dollar, *squared*. It is mathematically

impossible for a unit of value to be equivalent to the same unit of value squared (unless that unit of value always takes on a value of one or zero).

148. Above, I have tried to explain conceptually why the MEF parity exchange rate formula is fatally flawed and economically meaningless. However, not only is it fatally flawed and economically meaningless, it is also biased. That is, it has the effect of *systematically* undervaluing any land bond whose value is to be updated.

149. Take 1972 as an example. The official exchange rate in 1972 was 38.7 Soles Oro per U.S. dollar. Inflation in Peru over the period 1950 to 1972 was approximately three and a half times greater than inflation in the U.S. over the same time frame. Multiplying these first two terms of the MEF parity rate calculation yields approximately 133. Per the MEF Formula, this number is then divided by the "real exchange rate," which I have calculated to be approximately 0.12. *See* **Appendix M**.

150. Thus, under this methodology, the MEF's parity exchange rate is 1,141 Soles Oro per U.S. dollar, which contrasts with the official exchange rate of 38.7 Soles Oro per U.S. dollar. *See* **Appendix N.** In other words, under the MEF Formula, the estimated parity rate is *29* times larger than the official exchange rate in 1972. This massive difference between the MEF's parity exchange rate and the official exchange rate further shows that the formula is absurd and results in a nonsensical parity exchange rate.

151. The above disparity does not occur only in 1972. As **Appendix N** shows, the MEF's so-called parity is always many, many times greater than either the official exchange rate or my estimate of the parity exchange rate. Hence, whether a bond was issued in 1970, 1974, or 1979, the MEF's parity exchange rate will *always* result in an enormous undervaluation of the bond. (Like **Appendix K**, I present the y-axis on **Appendix N** in a logarithmic scale, so that the rapidly increasing exchange rates are still visible on the exhibit).

152. **Appendix N** also shows that in May 2005, the MEF's parity exchange rate is 5 *billion* times the official exchange rate. It is not conceptually reasonable for a parity exchange rate to be tens or hundreds of times the official exchange rate, much less 5 billion times. The fact that the MEF's parity exchange rate never comes close to the

official exchange rate and diverges massively for over forty years (whereas a properly estimated parity exchange, such as the one that I derive and present in **Appendix N**, will, at times, comes close to the official rate, and the paths of the two will in fact intersect) is clear evidence that the MEF's parity exchange rate is conceptually invalid and useless as an estimate of the parity exchange rate.

153. To illustrate the effect of using the MEF's parity exchange rate, consider, for example, Gramercy Bond No. 008615, which had a face value of 10,000 Soles Oro. Converting that face value in 1972 to dollars at the MEF parity exchange rate results in a U.S. face value of just under $9 (*i.e.*, 10,000 Soles Oro / 1,141 Soles Oro per U.S. dollar). In comparison, converting Gramercy Bond No. 008615's face value at the conceptually valid 1972 parity exchange rate results in a U.S. face value of $550 dollars (10,000 Soles Oro / 18.17 Soles Oro per U.S. dollar). The result under the nonsensical MEF parity exchange rate is 61 times *less* than the appropriate updated value.

154. In sum, the MEF's parity exchange rate formula is conceptually nonsensical, and therefore unsurprisingly results in nonsensical updated land bond values.

(2) The Failure to Account for Inflation from Issuance

155. Even overlooking the MEF's fatally flawed parity exchange rate, the MEF Formula has a significant flaw in its application of the parity exchange rate. The MEF Formula calls for the face value of the bond to be converted to U.S. dollars, at the parity exchange rate, at the date of the *first unclipped coupon*. This has the result of failing to compensate the bondholder for any inflation from the date of issuance to the date of the first unclipped coupon, which for some clipped bonds was significant. For example, when Gramercy Bond No. 008615 was issued in November 1972, the Peru CPI stood at 604; by November 1984, the date on which the last coupon of this bond was clipped, it stood at 120,165. Thus, despite the fact that the face value of the unpaid principal was significantly eroded by the nearly 20,000 percent inflation that occurred between 1972 and 1984, the MEF Formula ignores that inflation in updating the value of that bond.

(3) The Inappropriate Application of Yields on the 1-Year U.S. Treasury Bill

156. In addition to calling for the use of an erroneous parity exchange rate, the MEF Formula updates the face value of a land bond by applying, on a compound basis, a series of 1-year U.S. Treasury bill yields, presumably to capture both (expected) U.S. inflation and a real rate of return. As I discussed below in Section VI, the most conceptually appropriate real rate of return to employ is the real rate of return on debt in Peru (or, alternatively, the real rate of return on capital or the real rate of return on equity), which should be applied in addition to an inflation adjustment. The MEF does not explain why it selected a short-term, essentially risk-free yield, based on the U.S. economy, as an input. Indeed, it is difficult to understand how the return on a short-term security issued in the United States would constitute the relevant opportunity cost for the holders of long-term and defaulted Peruvian securities.

(4) The Inappropriate Decision to Update Bond Value Only as of 2013

157. Furthermore, the MEF Formula specifies that interest be compounded through 2013, and that the resulting value in dollars be converted to Soles at a 2013 exchange rate. To the extent that this reflects an intention to end the compounding of interest at any point prior to the date on which payment is made to the bondholders, and to expose bondholders to the risk of further inflation, the MEF Formula is again incorrect. I see no reason why bondholders should be exposed to further risk of inflation, and I know of no conceptual basis on which to stop the compounding of interest prior to the ultimate payment date. I am not aware of any sovereign debt instrument which stops accruing interest at some date years before payment. In addition, I note that the 2013 Sol-U.S. dollar exchange rate was among the lowest in recent history. See **Appendix O**.

(5) Summary

158. As indicated above, the CPI Method and the Dollarization Method yield similar updated values for Gramercy's overall portfolio of 5.34 billion Soles ($1.63 billion) and 5.04 billion Soles ($1.53 billion), each as of April 30, 2016. In contrast, the MEF Formula yields an updated value for Gramercy's entire portfolio of 2.9 million Soles ($1.1 million) as of 2013, representing less than one tenth of one percent of the

updated value under either the CPI Method or the Dollarization Method (*i.e.*, a 99.9 percent haircut). *See* **Appendices P and Q**.

159. Further evidence of the unreasonableness of the MEF Formula can be seen in the fact that the value of Gramercy's portfolio under the MEF Formula, $1.1 million, is even *less* than the value of Gramercy's portfolio, converted at the official foreign exchange rates prevailing at their dates of issuance, which totals approximately $9.4 million. In other words, a land bond issued in 1972 was worth *more* in U.S. dollars in 1972, than the value of that same bond in U.S. dollars today, after the value is purportedly updated using the MEF Formula. This is nonsensical, as the MEF Formula purports to account for both hyperinflation and interest over the past four decades, which should significantly increase the value of the bond today.

160. On the basis of the discussion above, I conclude that the MEF Formula for updating the value of the land bonds has no basis in economics and yields arbitrarily low valuations that are entirely disconnected from their true value.

VI. THE REAL RATE OF INTEREST

161. The previous two sections focused on updating the value of the land bonds to compensate bondholders for the value-eroding effect of the severe inflation experienced in Peru. In my calculations presented above, I also applied a real rate of interest, because, as discussed in Section III.C, to update the value of the land bonds, one must also compensate the bondholders for the rate of return that they could have expected to earn, had they received the expected land bond payments and invested them. In this section I first explain why this opportunity cost must be represented by a *real* Peruvian rate of interest and then explain how I arrived at a real rate of interest of 7.45 percent.

A. Real Peruvian Interest Rate

162. Typically, one would use a nominal interest rate to account for the foregone return from an investment. However, a nominal interest rate has two components: (1) the expected inflation rate, and (2) a real interest rate. As I described in detail above, both the CPI Method and the Dollarization Method already account for inflation; thus

it is appropriate to apply a *real* interest rate to update the land bond values from default to the present day, and not a nominal rate, because a nominal rate would double-count inflation and would generate a higher (or inflated) value of these bonds.

163. To appropriately compensate bondholders for the lost opportunity to invest, one must make an assumption about what investments they would have made, had they received payments on the land bonds. Bondholders could have invested in different forms of debt, ranging from informal (*e.g.*, loans to family members) to more formal (*e.g.*, loans to local businesses or debt issued by larger Peruvian companies). Alternatively, bondholders could have invested in equity, including buying shares on the Peruvian stock exchange or starting their own businesses. Bondholders likely would have employed some mix of these options.

164. Below, I first estimate the return on capital in Peru, which is equivalent to the return on a mix of both debt and equity investments across the entire Peruvian economy. Next, based on my estimate of the return on capital, I calculate the return on debt and the return on equity in Peru.

165. Before proceeding, it bears repeating that Peru was in a state of complete upheaval and turmoil between 1969 and the mid-1990s. Due to hyperinflation, political instability, terrorism, and economic meltdown, there are no reliable sources of clean and straightforward data (as one would find in an advanced or mature country) by which one can easily estimate real rates of return. Therefore, I use a number of generally accepted methods in the economic development field, which use available data, to estimate a reasonable real interest rate to be used to capture the opportunity cost faced by bondholders. The lack of reliable data is not unique to Peru. Almost all countries that have suffered from devastation, including war and hyperinflation, understandably lack reliable economic data. It is true of Germany during its hyperinflation, between June 1921 and January 1924, as well as many other nations from around the world that have suffered from hyperinflation, including, most recently, Zimbabwe.

B. Real Return on Capital

166. The method I explain here, first developed by Arnold Harberger in his work on the return on capital in Colombia, is widely viewed as the best and most acceptable method for calculating the return on capital in countries where financial market data are unreliable or not available. The return on capital is equal to the income earned by capital, divided by the total capital stock. In this section, I estimate the *real* return on capital by relying on a measure of real income earned by capital, divided by capital stock in real terms. These values are based on the National Accounts data of Peru.

167. To estimate the income earned by capital, I start with the real Peruvian GDP, which is a measure of Peruvian total income. That figure includes income that is earned by capital and labor. Therefore, I remove the income earned by labor, and then remove indirect taxes captured by the government, leaving me with the income earned by capital. I divide that amount by the capital stock in Peru to calculate the real return on capital. I do this in each year between 1950 and 2011, to get a long-term average real return on capital of 11.2 percent. As I show in Paragraph 174 below, this is a reasonable estimate of the potential return bondholders could have earned had they invested in Peru.

168. The formula for calculating the return on capital, using national accounts data, is as follows:

$$Return\ on\ capital = \frac{GDP \times (1 - labor\ share\ of\ income) \times (1 - indirect\ tax\ \%\ of\ GDP)}{capital\ stock}$$

169. To perform this calculation, I use data from the Penn World Tables,[94] a dataset created by a team of economists, supported by the United Nations, with a goal of comparing living standards and economic growth across countries.[95] The Penn World Tables were first released in 1991, and have been updated eight times since, most recently in 2015. The basis and methods underlying the Penn World Tables

[94] **CE-243**, Penn World Tables.

[95] **CE-231**, The Center for International Data, UC Davis Department of Economics, Penn World Table, May 2016.

estimates are the result of decades of research and data collection by some of the top macroeconomists in the world. The article describing the methodology used in the Penn World Tables is among the most widely cited papers in economics.[96] Today, the vast team of economists behind the Penn World Tables estimates over 40 key macroeconomic variables for 167 countries.

170. To estimate the share of Peruvian income generated specifically by capital (as opposed to other factors of production), I use these data to estimate the labor share and the non-labor share of income in each year between 1950 and 2011. The non-labor share of income is equal to the capital share of income (plus indirect taxes); therefore, by subtracting the labor share from real GDP, I arrive at an estimate of capital income (plus indirect taxes).

171. I then subtract the share of the total real GDP that is due to indirect taxes. The real GDP is an estimate of income based on sales of goods in the market, but the sales of goods include indirect taxes, such as sales and excise taxes. These indirect taxes impact the sale price of goods, and therefore are part of the prices used to calculate GDP; however, the income from the portion of sales that are due to indirect taxes is later gathered by the government, and therefore does not accrue to the owners of capital or labor. To remove these indirect taxes from my estimate of income, I rely on Central Bank of Peru tax data, which show that the average sales and excise taxes as a percent of GDP between 1970 and 2014 was 7.7 percent. I apply this 7.7 percent estimate to all years between 1950 and 2011.[97] With these adjustments, I estimate the capital income in Peru, which is the numerator in the formula above.

172. The team of economists that created the Penn World Tables has estimated the capital stock for Peru each year in 2005 U.S. dollars. The Penn World Tables' capital stock estimate is based on an estimate of the initial capital stock and estimates of Peru's

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96 **CE-182**, Feenstra et al., *Recasting International Income Differences: The Next-Generation Penn World Table*, VOX: CEPR's Policy Portal, September 2, 2013.

97 **CE-244**, Central Reserve Bank of Peru, Table 20.

capital investment, depreciation and growth.[98] That capital stock estimate contains only produced capital, and does not include natural capital, such as land. In order to incorporate natural capital in the calculation of the denominator in the formula above, I rely upon the methodology developed by Harberger to estimate the land value when calculating the real return to capital in an emerging nation. Harberger in turn relied on a study by Goldsmith, Lipsey and Mendelson, which found that in the United States the value of land has historically been 66.7 percent of the gross national product ("GNP") and 28.3 percent of the United States capital stock.[99] In his work, Harberger applied both of these U.S. estimates to the GDP and capital stock, respectively, of Colombia to calculate the value of land in Colombia. Similarly, I assume that the value of land in Peru is equal to the average of 66.7 percent of the Peruvian GDP and 28.3 percent of the capital stock in Peru.

173. Using the method described above, I estimate that the average real return on capital in Peru between 1950 and 2011 was 11.2 percent.

174. This real return on capital is a reasonable estimate of the return that bondholders could have expected to receive, had Peru not defaulted on the land bonds. Other studies support my calculation of the real return on capital in Peru of 11.2 percent. Peru's Ministry of Economics and Finance (MEF) published a paper in 2011 which described an analysis of the social discount rate (i.e., the hurdle rate for assessing public investments) in Peru during the 1990s and 2000s. In the paper, the MEF estimates an average return on capital in Peru over the period between 1994 and 2010 of 11.7 percent, which is very close to my long-term average of 11.2 percent.[100] Relying on a similar method to that employed by Harberger, Eduardo Moran and Gert

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98 Penn World Tables details their extensive estimation method for each of the relevant variables in their documentation. *See*, **CE-181**, Feenstra et al., *The Next Generation of the Penn World Table*.

99 **CE-49**, Harberger, *On Estimating the Rate of Return to Capital in Colombia*, in Project Evaluation, 1972, p. 149.

100 **CE-158**, Fernández-Baca, *Actualización de la Tasa Social de Descuento*, Ministerio de Economía y Finanzas, April 17, 2011; § 5.4

Wagner in 1972 estimated the return on capital in Chile between 1965 and 1970 at between 11.4 percent and 14.1 percent.[101]

C. Real Return on Debt and Equity

175. Using my estimated real return on capital, I now derive the real return on debt and equity. As noted, holders of the land bonds could have invested in debt or equity within Peru. Therefore, either the real return on debt or equity is a reasonable rate at which bondholders should be compensated for their lost opportunity to invest. Ultimately, to be conservative, I update the value of the land bonds based on the real return on debt, which is lower than both the return to capital and the return on equity; however, for the sake of completeness I calculate both the real return on debt and equity herein.

176. The real return on capital computed above represents a weighted average return across Peru's entire economy. Capital can be funded using either debt or equity, and is frequently funded using a mix of both. Therefore, the return on capital is a function of the return on debt and the return on equity. I have already estimated the return on capital in Peru, and therefore, relying on the concept of the weighted average cost of capital, I calculate the return on debt and equity in Peru using the following formula:[102]

$$R^{Peru}_{All\ Capital} = R^{Peru}_{Equity} \times \frac{Equity}{All\ Capital} + R^{Peru}_{Debt} \times \left(1 - \frac{Equity}{All\ Capital}\right)$$

(1) Proportion of Debt and Equity Capital in Peru

177. The term $\frac{Equity}{All\ Capital}$ is the proportion of capital in Peru that is funded with equity.

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[101] **CE-51**, Moran & Wagner, *Estimación de la Tasa de Retorno del Capital*, Latin American Journal of Economics (formerly Cuadernos de Economia), 1974, Vol. 11, No. 34, p. 31.

[102] This equation is in the spirit of the WACC formula in Franco Modigliani and Merton Miller's seminal 1958 paper. They won the Nobel Prize for their work on the cost of capital in 1985. **CE-44**, Modigliani & Miller, *The Cost of Capital, Corporation Finance and the Theory of Investment*, The American Economic Review, Vol. 48, No. 3, June 1958, pp. 261-297.

178. The term $\left(1 - \frac{Equity}{All\ Capital}\right)$ is one minus the share of capital in Peru that is funded with equity, and thus is equal to the share of capital that is funded with debt.

179. As discussed above, Peru lacks reliable economic data during much of the period since 1969, so I rely on more recent data to make an estimate of the share of Peru's economy that was funded with debt and equity. As I note below, I estimate that the proportion of equity relative to all capital is approximately 50 percent and correspondingly, the proportion of debt relative to all capital is also 50 percent.

180. For instance, the World Bank's Global Financial Development Database contains extensive financial data for Peru from 1994 through 2012, including the amount of debt securities and bank credit outstanding and the capitalization of the stock market over this period, each expressed as a percentage of GDP.[103] Based on these data, the estimated proportion of equity relative to all capital in Peru is 44 percent, and the estimated proportion of debt relative to all capital is 56 percent.

181. Likewise, a publication of The Emerging Markets Committee of the International Organization of Securities Commissions reports the capitalization of the Peruvian stock market and the outstanding amounts of bank loans and debt securities as a percentage of Peru GDP in 1999.[104] Based on these data, the estimated proportion of equity relative to all capital in Peru is 45 percent, and the estimated proportion of debt relative to all capital is 55 percent.

182. Additionally, a chapter from the IMF's 2005 Global Financial Stability Report reports the capitalization of the Peruvian stock market, as well as the outstanding amounts of

[103] The 2015 Global Financial Development Database covers the period from 1960 through 2013, but data for Peru are only available for 1994 through 2012. The line item "Outstanding total international debt securities / GDP (%)," *i.e.*, the outstanding amount of total international debt securities as a percentage of GDP, is available beginning in 1995. For 1994, I assume that this percentage was zero, *i.e.*, that there were no outstanding international debt securities. To calculate the amount of bank credit as a percentage of GDP, I multiply the line item "Bank credit to bank deposits (%)," *i.e.*, the amount of bank credit as a percentage of bank deposits, by the line item "Bank deposits to GDP (%)", *i.e.*, the amount of bank deposits as a percentage of GDP. **CE-207**, Global Financial Development Dataset (GFDD), The World Bank, September 2015.

[104] **CE-91**, International Organization of Securities Commissions, Emerging Markets Committee, *The Development of Corporate Bond Markets In Emerging Market Countries*, May 2002, p. 74.

bank credit and domestic debt, as of 2004.[105] Based on these data, the estimated proportion of equity relative to all capital in Peru is 51 percent, and the estimated proportion of debt relative to all capital in Peru is 49 percent.

183. Based on these data sources, I assume a 50-50 split between equity and debt in Peru. These estimates of the debt-equity proportions in Peru's economy are based on recent data; earlier in the relevant period, from 1969 through the 1980s, Peru's more informal economy would likely have had a higher proportion of debt relative to all capital. (Informal economies, which tend to be quite prevalent in emerging markets, typically feature high levels of debt as a percentage of capital.)

184. Even in more recent years, the informal market remains quite prominent in Peru. A 1997 survey of 499 households in Piura, Peru showed that 34 percent of households received some sort of informal loan.[106] Additionally, a Gallup poll released in 2012 found that 17 percent of respondents in Peru received a loan from a family member, friend, or an informal private lender.[107] Given the widespread use of the informal market and the high proportion of debt relative to all capital, using a 50-50 split is conservative, as it serves to ultimately reduce the real return on debt, relative to a split weighted more heavily towards debt.

(2) Peru's Spread between Equity Return and Debt Return

185. As discussed above, the formula for the weighted average return on capital is:

$$R^{Peru}_{All\ Capital} = R^{Peru}_{Equity} \times \frac{Equity}{All\ Capital} + R^{Peru}_{Debt} \times \left(1 - \frac{Equity}{All\ Capital}\right)$$

186. The term R^{Peru}_{Equity} is the real return on equity in Peru, and the term R^{Peru}_{Debt} is the real return on debt in Peru. As discussed above, I've estimated the real return on capital in Peru to be 11.2 percent. In addition, I estimate that equity and debt comprise equal

[105] **CE-113**, International Monetary Fund, *Development of Corporate Bond Markets in Emerging Market Countries*, Global Financial Stability Report, September 2005, p. 105.

[106] **CE-118**, Guirkinger, *Understanding the Coexistence of Formal and Informal Credit Markets in Piura, Peru*, World development 36.8, September 2006, Table 1.

[107] **CE-171**, Gallup, Banking Use Trails in Latin America, July 2012.

shares of total capital in Peru. Therefore, we are left with two unknowns in the equation above—return on equity and return on debt. Due to the lack of reliable, historical data in Peru, precise measures of return on debt or equity cannot be directly estimated; as is often the case in emerging economies, an indirect method has been used to obtain these historical estimates which relies on the relationship between these two returns.

187. Normally, in algebraic terms, when we have an equation with two unknowns, we are unable to solve for either unknown. However, we can first specify a relationship between the return on equity and the return on debt (namely, that the return on equity is equal to the return on debt plus a known spread), as:

$$R_{Equity}^{Peru} = R_{Debt}^{Peru} + Spread_{Equity-Debt}^{Peru}$$

The relationship between the return on equity and the return on debt as described in the equation above is appropriate and straightforward; as is commonly accepted by theorists and practitioners in financial economics, the return on equity is expected to be (and generally is) greater than the return on debt due to the fact that equity is generally riskier than debt.[108]

188. If we can measure or estimate that spread in returns, then we can specify the weighted average return on capital equation such that we have one equation and only one unknown—the return on debt—which we can then solve for:

$$R_{All\ Capital}^{Peru} =$$

$$\left(R_{Debt}^{Peru} + Spread_{Equity-Debt}^{Peru}\right) \times \frac{Equity}{All\ Capital} + R_{Debt}^{Peru} \times \left(1 - \frac{Equity}{All\ Capital}\right)$$

189. Thus, once we know the spread in returns between debt and equity, the only unknown is the return on debt. While the spread is not directly observable, we can conservatively estimate it by measuring something known as the equity risk premium. The equity risk premium is actually the spread between the return on equity and the risk-free rate. In other words, the return on equity itself is comprised of two

[108] *See, e.g.,* **CE-155**, Brealey et al., *Principles of Corporate Finance,* 10th Ed., 2011, p. 216.

components: the risk-free rate (i.e., the return one earns for investing in a security that is risk-free) *plus* the return owed to investors for taking on risk of owning equity (the equity risk premium). Mathematically:

$$R_{Equity}^{Peru} = R_{risk\ free} + \ Risk\ Premium_{Equity}^{Peru}$$

190. The return on debt, too, has two components: the risk-free rate (the same risk-free rate that constitutes a component of the return on equity) *plus* the debt risk premium, or the return owed to investors for taking on the risk of lending money to risky borrowers. Mathematically:

$$R_{Debt}^{Peru} = R_{risk\ free} + \ Risk\ Premium_{Debt}^{Peru}$$

191. Therefore, the spread in between the return on equity and the return on debt can be expressed as:

$$Spread_{Equity\ -\ Debt}^{Peru} =$$

$$R_{risk\ free} + \ Risk\ Premium_{Equity}^{Peru} - (R_{risk\ free} + \ Risk\ Premium_{Debt}^{Peru})$$

192. Because the "risk free rate" terms cancel out, we're left with the following expression:

$$Spread_{Equity\ -\ Debt}^{Peru} = Risk\ Premium_{Equity}^{Peru} - \ Risk\ Premium_{Debt}^{Peru}$$

193. The equity risk premium is a value that is studied and estimated by academics, and therefore I rely on such work to estimate the spread between the return on equity and the return on debt in Peru.[109] By contrast, data on Peru's debt risk premium for the relevant timeframe are unavailable; hence, I conservatively assume that the spread between the expected return on debt and equity is equal to the equity risk premium. Because I use the full equity risk premium (instead of the equity risk premium minus the debt risk premium) as a proxy for the spread between the real rate of return on equity and the real rate of return on debt, I overstate the spread between the two rates. Because I ultimately use the return on debt as the measure of interest, overstating the spread between the rates is conservative—the wider the spread between the two rates,

[109] **CE-94**, Brealey, et al., *Principles of Corporate Finance*, 7th Ed., 2003, pp. 152-185.

the lower the real rate of return on debt, and the lower the resulting updated value of a land bond.

194. To illustrate how using the equity risk premium to approximate the spread between the rate of return on equity and that on debt would result in a conservative estimate of the rate of return on debt, consider the following example. Suppose that we know that the risk-free rate is 5.2 percent, the debt risk premium is 3 percent, and the equity risk premium is 9 percent (i.e., the spread between the debt rate of return and the equity rate of return is 6 percent). With these inputs, the corresponding rates of return on debt and equity are 8.2 percent and 14.2 percent, respectively. With a 50-50 split between debt and equity capital, the weighted average rate of return on all capital would be 11.2 percent.

195. Now suppose the size of the debt risk premium is not observable, and consequently, one uses the full equity risk premium of 9 percent to approximate the 6 percent spread between the debt and equity rates of return. Using 9 percent as the spread, the imputed rates of return on debt and equity are 6.7 percent and 15.7 percent, respectively. Thus, the rate of return on debt is underestimated by 1.5 percentage points when the full equity risk premium is used to approximate the spread between the rate of return on equity and that on debt.

196. An annual market survey found that the average equity market risk premium used by "finance and economics professors, analysts, and managers of companies" in Peru ranged from 6.5 percent to 8.1 percent in each year from 2011 to 2016, with an average of 7.5 percent across those years.[110] I am unable to find reliable data with respect to the equity risk premium for earlier years; consequently, I rely on these survey data and assume that the historical spread between the return on equity and the return on debt in Peru is 7.5 percent.

[110] **CE-193**, Fernández et al., *Market Risk Premium Used in 88 Countries in 2014: A Survey with 8,228 Answers*, IESE Business School, June 2014, p.8; **CE-202**, Fernández et al., *Market Risk Premium Used in 41 Countries in 2015: A Survey*, IESE Business School, April 2015, p.3; **CE-230**, Fernández et al., *Market Risk Premium Used In 71 Countries In 2016: A Survey With 6,932 Answers*, IESE Business School, May 2016, p. 3.

(3) Calculation of the Real Return on Debt and the Real Return on Equity

197. With these inputs, I can now solve for the real return on debt and equity. The formula above, expressing the relationship of the return on equity as the return on debt plus the spread, can be plugged into the weighted average return on capital formula, resulting in:

$$R_{All\ Capital}^{Peru} =$$

$$\left(R_{Debt}^{Peru} + Spread_{Equity-Debt}^{Peru}\right) \times \frac{Equity}{All\ Capital} + R_{Debt}^{Peru} \times \left(1 - \frac{Equity}{All\ Capital}\right)$$

198. Solving for R_{Debt}^{Peru} yields:

$$R_{Debt}^{Peru} = R_{All\ Capital}^{Peru} - Spread_{Equity-Debt}^{Peru} \times \frac{Equity}{All\ Capital}$$

199. Substituting the variables which I have estimated above, which are the real return on capital of 11.2 percent, the debt equity split of 50-50 percent and the equity risk premium of 7.5 percent, results in:

$$7.45\ percent = 11.2\ percent - 7.5\ percent \times 50\ percent$$

200. Consequently, the real return on debt is 7.45 percent; adding the equity risk premium of 7.5 percent to the real return on debt, I estimate that the real return on equity is 14.95 percent. The real returns on capital, debt, or equity are each reasonable estimates of the return that holders of the land bonds could have received. As I cannot know what such bondholders would have invested in, I conservatively rely on the real return on debt of 7.45 percent as my estimate of the real interest rate with which to update the value of the land bonds.

D. Supporting Estimates of the Real Rate of Interest

201. To assess the robustness of these estimates of the real rates of return on capital, debt, and equity, I relied on more recent data to compute the same variables. In all cases, my alternative computations support the figures reported above: an average real return on capital as a whole of 11.2 percent, an average real return on debt of 7.45 percent, and an average real return on equity of 14.95 percent for the period 1970

through 2015. In the paragraphs that follow, I discuss briefly these alternative computations.

202. I estimate the real cost of debt in Peru using United States real lending interest rates from the World Bank, and adding an additional spread to compensate for the increased risk of default in Peru. I estimate the additional spread in Peru based on back-casted Latin American credit default swap ("CDS") spreads. Appendix C provides an in-depth discussion of my method. Using this approach, I estimate that average real return on debt in Peru between 1970 and 2015 was 7.54 percent, very similar to my initial estimate of 7.45 percent. As I discuss in Appendix C, my method is conservative, but the result is very much in line with my estimate of the real return on debt based on the real return on capital and weighted average return on capital calculations.

203. Another source of comparison is the World Bank real interest rate data for Peru. The World Bank calculates the Peruvian real interest rate by subtracting the realized inflation rate from the nominal interest rate on loans. The World Bank provides these data each year from 1986 to 2014; over that period, Peru's average real interest rate was 14.5 percent. Due to the severe economic unrest in the late 1980s and early 1990s, the values between 1986 and 1992 vary significantly, ranging from -60 percent to 76.4 percent. After 1992, when the Peruvian economy (and especially prices) stabilized, the World Bank real interest rate estimates settle into a range between 12.2 percent and 32.1 percent.[111]

204. The World Bank's real interest rate values are higher than my estimate of the real return on debt using the weighted average return on capital formula, my estimate of the real return on capital, and my estimate using CDS. The World Bank's real interest rates give me comfort that my use of the real return on debt, 7.45 percent, as the real interest rate, is both reasonable and conservative.

205. In summary, I calculate a real return on capital from the national accounts, and then derive a real return on debt and equity based on the weighted average return on

[111] **CE-245**, World Bank Data, Peru Real Interest Rate (%).

capital formula. Insofar as I cannot know what the bondholders would have invested in had they been paid on the land bonds, I rely on the real return on debt as the real interest rate to update the value of the land bonds. I find that additional data sources further support the reasonableness of my estimated return on debt of 7.45 percent.

VII. PERU CAN AFFORD TO REPAY THE FULL VALUE OF THE LAND BONDS GIVEN THE STRENGTH OF ITS ECONOMY

206. In its 2013 Order, the Constitutional Tribunal's majority provided that the value of the land bonds be updated under the Dollarization Method, arguing in part that Peru could not reasonably afford to repay the land bonds at the updated value yielded by the CPI Method. The Constitutional Tribunal asserted that the CPI Method-derived updated value "would [impose] serious impact on the Budget of the Republic, to the point of making impracticable the very payment of the debt."[112] The Constitutional Tribunal also referred to the necessity of balancing the need to "pay the agricultural debt and to promote the general wellbeing," and could "not absolutely [give] preference to one over the serious sacrifice that may happen to the other."[113]

207. In this section, I evaluate the economic aspects of the Constitutional Tribunal's assertion that Peru cannot afford to repay the land bonds based on the updated value yielded by the CPI Method by analyzing the impact of such repayment on Peru's budget and debt-to-GDP ratio. (I express no view on whether difficulty in making payments constitutes a legally valid basis for paying less than is owed.) I then describe the current state of Peru's economy with reference to certain key metrics that bear on Peru's ability to repay the land bonds. I find that, economically, the repayment of the land bonds at the CPI Method-derived updated value would not impose an undue burden on Peru's budget or harm its citizenry.

208. For the purposes of this evaluation, I estimate that the total updated value of all outstanding land bonds under the CPI Method is between $7.99 and $10.65 billion as of April 2016, based on the following. First, I note that the 2005 Agrarian

[112] **CE-17**, Constitutional Tribunal of Peru, Order, July 16, 2013, ¶ 25.

[113] **CE-17**, Constitutional Tribunal of Peru, Order, July 16, 2013, ¶ 25.

Commission of the Peruvian Congress report stated that the face value of unpaid principal on the outstanding land bonds was reported to be either 1,891 million Soles Oro or 2,521 million Soles Oro.[114] I also note that the Gramercy portfolio contains land bonds with a face value of unpaid principal equal to 385 million Soles Oro. Therefore, Gramercy owns between 15 and 20 percent of the total outstanding land bonds. I assume that Gramercy's portfolio of land bonds is representative of total outstanding land bond debt, and therefore that my valuation of the Gramercy land bonds can be applied to the entire portfolio. I therefore calculate a range of the updated value of the entire portfolio between $7.99 and $10.65 billion, as follows:

$$\$7.99\ billion\ = \frac{1{,}891\ million}{385\ million} \times 1.626\ billion$$

$$\$10.65\ billion\ = \frac{2{,}521\ million}{385\ million} \times 1.626\ billion$$

209. Implicit in this calculation and in the discussion that follows is the conservative assumption that all bondholders would participate in an exchange offer were Peru to cure its selective default. To the extent that some would not—because the bonds were lost or because some bondholders may be elderly or poorly-informed—the burden on Peru would be that much lighter.

A. Peru's Economy is Growing and Can Support the Full Repayment of the Land Bonds

(1) Recent growth in GDP and GDP per capita

210. Growth in GDP and real per capita GDP is crucial to a country's ability to maintain and increase its tax revenues. All else equal, an increase in GDP and real per capita GDP leads to an increase in tax revenues, which results in cash flows that the government can use to service and repay debt.

[114] **CE-12**, Opinion issued on Draft Laws N° 578/2001-CR, N° 7440/2002-CR, N° 8988/2003-CR, N° 10599/2003-CR N° 11459/2004-CR, and N° 11971/2004-CR.

211. Over the last decade, and as a result of pragmatic pro-competition policies, Peru's GDP has more than doubled from less than $100 billion to nearly $200 billion.[115] Similarly, Peru's real per capita GDP has increased by nearly 50 percent over the same period, growing at 3.4 percent annually. *See* **Appendix R**. Standard & Poor's ("S&P") projects continued growth in Peru's real GDP through 2018 at a healthy annual rate of between 3.5 percent and 4.5 percent.[116] Similarly, Moody's also projects continued growth in Peru's real GDP.[117] Peru's recent historical and estimated future GDP growth indicate that the government will be able to garner increasing tax revenues, lessening the fiscal burden of servicing and repaying the land bonds.

(2) Peru's debt-to-GDP ratio

212. The debt-to-GDP ratio is a commonly used measure of a country's level of indebtedness, and provides useful context for a country's total outstanding debt by comparing this amount to the size of the economy, as measured by the GDP.

213. If Peru were to issue between $7.99 and $10.65 billion in new debt in order to repay the land bonds, the new debt would be added to Peru's current total outstanding debt. The newly-issued debt would have a very limited impact on Peru's debt-to-GDP ratio and total outstanding debt. Moreover, as I discuss below, whatever the impact of this newly-issued debt, it would potentially stand to be offset by an improvement in Peru's credit ratings following the repayment of these defaulted securities.

214. Peru has a low debt-to-GDP ratio, which has declined significantly over the last decade from over 40 percent in 2005 to less than 25 percent at the end of 2015 (excluding the land bonds in both instances).[118] Peru's debt-to-GDP ratio is very low compared to the debt-to-GDP ratios of other Latin American countries as well as

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[115] **CE-246**, Central Reserve Bank of Peru, Table 4.

[116] **CE-20**, Standard & Poor's, Supplementary Analysis: Republic of Peru, September 30, 2015, p. 5.

[117] **CE-206**, Moody's Investors Service, Moody's: Peru's A3 Rating Underpinned by Strong Policy Framework and Existing Buffers, August 25, 2015.

[118] **CE-247**, Central Reserve Bank of Peru, Table 113.

certain OECD-member countries.[119] For example, in early 2015, Colombia, Germany, the United Kingdom, and the United States each had far higher debt-to-GDP ratios than did Peru.[120] *See* **Appendices S, T and U**. In addition, S&P forecasts that Peru's debt-to-GDP ratio, excluding the land bonds, will not increase significantly over the next three years, and will remain below 25 percent through 2018.[121]

215. Peru's total outstanding debt at the end of 2015 amounted to $42.2 billion.[122] Even assuming the highest value for the outstanding land bonds, the estimated $10.65 billion of newly-issued debt would increase this total by just over 25 percent, and would increase Peru's debt-to-GDP ratio 5.5 percentage points, from 22.0 percent to 27.5 percent, as of 2015, all else equal. *See* **Appendix V**. Even with the land bond debt included, Peru's debt-to-GDP ratio would remain well below those of Colombia, Germany, the United Kingdom, and the United States and would not pose a threat to Peru's continued growth.[123] *See* **Appendix U.**

216. According to Moody's, the median debt-to-GDP ratio of A-rated countries is approximately 40 percent, indicating that the newly-issued debt would most likely have no adverse effect on Peru's credit rating.[124] Therefore, contrary to the Constitutional Tribunal's stated concerns, Peru's economy is strong enough to issue and support the amount of new debt needed to fund the repayment of the bondholders at the CPI Method-derived updated value of the land bonds.

B. Peru's Recent and Forecasted Spending Can Accommodate the Full Repayment of the Land Bonds

217. The Constitutional Tribunal claims that the repayment of the land bonds would have significant ramifications for Peru's budget and would, in turn, harm Peru's citizenry.

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[119] **CE-248**, World Bank Data, General Government Public Sector Debt (% of GDP).

[120] The World Bank's data do not include Argentina or Chile.

[121] **CE-20**, Standard & Poor's, Supplementary Analysis: Republic of Peru, September 30, 2015, p. 6.

[122] **CE-249**, Central Reserve Bank of Peru, Table 112; **CE-246**, Central Reserve Bank of Peru, Table 8.

[123] **CE-147**, Reinhart & Rogoff, *Growth in a Time of Debt*, NBER Working Paper Series, Working Paper 15639, January 2010.

[124] **CE-21**, Moody's Investors Service, FAQs on Peru's Bonos de la Deuda Agraria, December 18, 2015.

In order to assess this claim, I analyze Peru's current fiscal circumstances and the likely impact that repayment of the land bonds would have on Peru's budget.

218. Peru is currently stable and strong from a budgetary perspective. Over the last decade, Peru has generated an average surplus of over $1.1 billion dollars per year, representing approximately 0.9 percent of GDP.[125] *See* **Appendix W.** S&P forecasts that, mostly as a result of the decline in commodity prices, Peru will run small deficits as a percentage of real GDP in each of the next three years.[126] Developed OECD countries such as France, the United Kingdom, and the United States frequently run deficits that, as a percentage of GDP, are far larger than that of Peru.[127]

219. If Peru were to issue 30-year government bonds to fund the repayment of the land bonds at the current 6.73 percent yield-to-maturity of its outstanding 30-year bonds, and the newly-issued bonds were to be amortized such that both principal and interest were paid in each year of their 30-year terms, the resulting payments would amount to between $627 and $835 million per year:[128]

$$\$627\ million = \frac{0.0673\ \times\ \$7.99\ billion}{1-(1+0.0673)^{-30}}$$

$$\$835\ million = \frac{0.0673\ \times\ \$10.65\ billion}{1-(1+0.0673)^{-30}}$$

220. Servicing the newly-issued bonds would have a negligible effect on Peru's total expenditure and budget deficit. In 2015, the expenditure of the Peruvian non-financial public sector was $37.8 billion, including $2.0 billion in interest

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125 **CE-249**, Central Reserve Bank of Peru, Table 15; **CE-246**, Central Reserve Bank of Peru, Tables 4 and 8.

126 **CE-20**, Standard & Poor's, Supplementary Analysis: Republic of Peru, September 30, 2015, p. 11.

127 **CE-250**, World Bank Data, Cash surplus/deficit (% of GDP).

128 The yield-to-maturity on a 30-year Peruvian government bond on May 18, 2016 was 6.73 percent. The yield-to-maturity is the return an investor would achieve by purchasing the bond at its current market price and holding the bond until maturity. Therefore, if Peru were to issue new bonds, Peru would need to offer to pay an interest rate of 6.73 percent in order to sell the bonds at their face value.

CE-232, Bloomberg, Peru 30-year Government Bond yield data.

payments.[129] Even the higher value of $835 million represents just over 2 percent of Peru's current annual government expenditure, and just under 0.50 percent of Peru's current GDP. By either measure, the repayment of the land bonds would have a minimal impact on the budget. If Peru's economy continues to grow as expected, this $835 million annual payment would represent an even smaller proportion of Peru's total anticipated expenditures and GDP.[130] *See* **Appendix X**.

221. Moody's expressed a similar view in a December 2015 study regarding the effect of repaying the land bonds, stating that "we believe that the effect [on fiscal accounts] would be limited and manageable. The amount would likely be paid out over time, rather than as a one-time payment."[131]

222. Therefore, contrary to the stated concerns of the Constitutional Tribunal, Peru could readily service the additional payment of between $627 and $835 million per year that would be needed to fund the full repayment of the land bonds at the CPI Method-derived updated value.

C. Peru's Currency is Stable and Inflation is Low

223. I now discuss other measures of Peru's economic condition to further assess Peru's ability to repay the land bonds.

224. Low inflation is vital to a country's ability to collect taxes, manage the budget, and service debt. As taxes are largely paid based on prior year nominal income, profits, and/or asset valuations, significant inflation reduces government tax receipts in real terms. The majority of government expenditure is based on current year price levels, which incorporate the impact of inflation. Therefore, as inflation increases, governments are less able to maintain surpluses or small deficits, and are less able to meet debt service requirements.

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[129] In countries in which there is significant government ownership of enterprises, or countries in which the governments pursue public policy objectives through semi-private enterprises, a more appropriate measure of government spending and the budget is the non-financial public sector. *See, e.g.*, **CE-137**, Nonfinancial Public Sector Statistics, IMF Government Finance Statistics Manual 2001.

CE-249, Central Reserve Bank of Peru, Annual Statistical Tables.

[130] **CE-20**, Standard & Poor's, Supplementary Analysis: Republic of Peru, September 30, 2015, pp. 11-12.

[131] **CE-21**, Moody's Investors Service, FAQs on Peru's Bonos de la Deuda Agraria, December 18, 2015.

225. Peru's inflation rate has remained low over the previous decade, averaging 3.1 percent annually.[132] Peru's low rate of inflation is similar to the rates of inflation experienced by neighboring countries Chile and Colombia, as well as those experienced by some of the largest Group of Eight ("G-8") countries, including Germany, the United Kingdom, and the United States.[133] *See* **Appendices Y and Z**.

226. Peru's low inflation rate suggests that tax collections in real terms are unlikely to erode, and that Peru stands to continue running surpluses or small deficits even upon repaying the land bonds.

D. Peru Maintains a Strong Sovereign Credit Rating

227. Sovereign credit ratings reflect rating agencies' assessments of countries' abilities to service debt. Peru's strong credit ratings reflect the rating agencies' belief that Peru would be well able to issue and repay new debt given its current financial and economic situation. I understand that questions have been raised about the manner in which the credit rating agencies have accounted – or failed to account – for the land bond debt.[134] Notwithstanding this, the ratings assigned by the agencies, and the analysis performed by the agencies, suggests that Peru would be able to repay the land bond debt.

228. Peru is currently rated BBB+ by S&P and A3 by Moody's, with each grade being multiple notches above the investment grade threshold.[135] S&P moved Peru to an investment grade rating in 2008, and Moody's followed suit the next year, with both rating agencies subsequently raising Peru's credit ratings further multiple times.[136]

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132 **CE-249**, Central Reserve Bank of Peru, Annual Inflation Table.

133 **CE-251** World Bank Data, Inflation, Consumer Prices (annual %).

134 **CE-201**, Subcommittee on Capital Markets and Government Sponsored Enterprises Hearing, Continued Oversight of the SEC's Offices and Divisions, April 21, 2015, available at <https://www.youtube.com/watch?v=OVV0zneOIDs>.

135 **CE-20**, Standard & Poor's, Supplementary Analysis: Republic of Peru, September 30, 2015, p. 3; **CE-21**, Moody's Investors Service, FAQs on Peru's Bonos de la Deuda Agraria, December 18, 2015; S&P classifies credit ratings of BBB- and above as investment grade, and Moody's classifies credit ratings of Baa3 and above as investment grade.

136 **CE-20**, Standard & Poor's, Supplementary Analysis: Republic of Peru, September 30, 2015; **CE-21**, Moody's Investors Service, FAQs on Peru's Bonos de la Deuda Agraria, December 18, 2015.

Moreover, Moody's recently stated that it "does not expect Peru's credit quality to change significantly over the next year or two."[137] Other than the rating agencies' statements regarding the land bonds, the rating agencies' assignment of strong credit ratings indicate confidence in Peru's creditworthiness. These strong sovereign credit ratings provide additional support for the view that Peru would be able to repay the land bond debt.

E. Benefits of Repayment

229. As discussed above, by various measures Peru could well afford to fully repay the land bonds at their CPI Method-derived updated value. In addition, the repayment of the land bonds would arguably benefit Peru in several respects. Potential investors and other observers have frequently noted a lack of confidence in Peru's institutions.[138] Repaying the land bonds would serve to improve investor confidence in Peru which, in turn, would have positive implications with respect to foreign direct investment.

(1) Enhanced confidence in Peruvian institutions

230. Market observers have expressed a relative lack of confidence in Peruvian institutions, including the courts and the national and local governments. Peru's ongoing default on the land bonds, as well as the failure of the courts and the executive and legislative branches of the government to remedy the situation, have contributed to this perception of institutional weakness. Repayment of the land bonds would serve to enhance confidence in these institutions.

231. For example, the rating agency Egan-Jones reported in its recent evaluation of Peru that "Our Assessment of Peru's Institutional Strength: Weak."[139] Egan-Jones

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137 **CE-20**, Standard & Poor's, Supplementary Analysis: Republic of Peru, September 30, 2015, p. 3; **CE-21**, Moody's Investors Service, FAQs on Peru's Bonos de la Deuda Agraria, December 18, 2015.

138 **CE-196**, U. S. Department of State, Peru Investment Climate Statement 2015, pp. 18-19; *see also* **CE-200**, U.S. Commercial Service, United States of America Department of Commerce, *Doing Business in Peru: 2015 Country Commercial Guide for U.S. Companies*, 2015.

139 **CE-22**, Egan-Jones Ratings Company, Egan-Jones Assigns A First-time Rating of "BB" To The Republic Of Peru's International Bonds, November 17, 2015, p. 5.

emphasized Peru's default on the land bonds, and its inadequate institutional response thereto:

> In our view, the 2014 administrative decree [regarding the land bonds] sets a very dangerous precedent for all Peruvian bonds, particularly the Soberanos [local currency bonds] which are also subject to Peruvian law.[140]

232. In 2012, Beatriz Merino, Peru's former prime minister and national ombudsman for the people, publicly urged the government to repay the land bonds, stating that "[Peru] could send a national and international signal that compliance with the mandates of the courts is a moral, legal and constitutional aim of this government."[141] Merino further asserted that "Peru today has a respected economy and aspires to be a first-world country. With that comes responsibilities. And one of those responsibilities is to honor its debts."[142]

233. The World Bank's "Country Partnership Strategy for the Republic of Peru," adopted jointly with Peru in 2012, also highlights the improvement of Peruvian governance and institutions as a crucial development point:

> [d]uring the last decade, the country has been working to strengthen institutions and promote greater transparency and accountability, but there are still some challenges ahead …. [d]espite progress in these areas, public confidence in the efficiency and the effectiveness of many state institutions remains low.[143]

234. Similarly, the OECD, in its analysis of Peru's potential application to join the organization, expressed concern about Peru's poor rule of law and corruption:

> The Rule of Law indicator is lower than that of Colombia. In the fight against corruption, Peru's indicators are poor. Chile—at the time it joined

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[140] **CE-22**, Egan-Jones Ratings Company, Egan-Jones Assigns A First-time Rating of "BB" To The Republic Of Peru's International Bonds, November 17, 2015, p. 7.

[141] **CE-169**, Reuters, Exclusive: Peru's Merino to Push for Payment of Defaulted Bonds, March 13, 2012.

[142] **CE-169**, Reuters, Exclusive: Peru's Merino to Push for Payment of Defaulted Bonds, March 13, 2012.

[143] **CE-167**, International Bank for Reconstruction and Development, International Finance Corporation and Multilateral Investment Guarantee Agency, Country Partnership Strategy for the Republic of Peru for the Period FY12-FY16, February 1, 2012, ¶19.

> the OECD as a full member—had a level of control of corruption almost twice that of Peru in 2013. [144]

235. More recently, in April 2016, during a United States Congressional hearing, Brad Sherman, a congressman from California, and Mike Fitzpatrick, a congressman from Pennsylvania asked Thomas Butler, the director of the SEC's Office of Credit Ratings, to address the land bonds. In particular, the congressmen questioned Butler about Peru's "default" on the land bonds and the rating agencies' failure to rate the land bonds or take them into account in their ratings of Peru.[145]

236. While there has not been extensive international press regarding the land bonds, several recent articles discuss how the default negatively impacts the perception of Peru. For example, in March 2016, Reuters published an article discussing the land bonds, entitled "Peru Hides $5 Billion Land Bond Default and Misleads International Investors While Promising 'Great Opportunities' in Road Show." The Miami Herald, in October 2015, published an article entitled "Peru's test on respect for rule of law," which also discussed Peru's default on the land bonds.[146]

(2) Potential ratings upgrade

237. Notwithstanding the manner in which the credit ratings agencies have accounted for the land bond debt, it is worth noting that S&P and Moody's have focused on this lack of institutional strength when evaluating Peru's credit ratings, which suggests that improved confidence in Peruvian institutions could result in upgrades. For example, S&P stated in its September 2015 review of Peru the following:

> Further improvements in Peru's political landscape, such as stronger institutions and public-sector capacities to deliver social and infrastructure needs, could lead to stronger creditworthiness. Improved government effectiveness, along with more investment in the country's infrastructure

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144 **CE-198**, Peru 2021: OECD Member Country, OECD: National Strategic Planning Center, pp. 10, 31.

145 **CE-201**, Subcommittee on Capital Markets and Government Sponsored Enterprises Hearing, Continued Oversight of the SEC's Offices and Divisions, April 21, 2015, available at <https://www.youtube.com/watch?v=OVV0zneOIDs>.

146 **CE-223**, Reuters, Peru Hides $5 Billion Land Bond Default and Misleads International Investors While Promising 'Great Opportunities' in Road Show, March 9, 2016; **CE-209**, Miami Herald, Peru's Test on Respect for Rule of Law, October 7, 2015.

> and continued cautious macroeconomic policy, could boost investor confidence. We could raise the ratings under such a scenario.[147]

238. Moody's similarly noted in December 2015:

> Although upward pressure on the sovereign's rating is unlikely over the medium term, a substantial increase in income levels or a significant strengthening of governance indicators, especially related to political institutions, would contribute to improving creditworthiness.[148]

(3) Lower cost of borrowing

239. While repaying the land bonds may or may not result in a credit rating upgrade, this course of action would strengthen investors' confidence in Peru's institutions. An increase in investor confidence in Peru, even in the absence of a concomitant ratings upgrade, would also likely reduce the cost of borrowing borne by the Peruvian government.

240. A lower cost of borrowing would stand to reduce Peru's cost to service all other outstanding Peruvian debt. It would be speculative to attempt to estimate the reduction in total debt service costs from repaying the land bonds, but due to the small size of the land bond debt service costs, it is quite possible that the reduction in total debt service costs would fully offset the land bond service costs.

241. In sum, I find that the Constitutional Tribunal's economic assertions that Peru could not afford to repay the land bonds are unfounded and incorrect. Updating the value of the land bonds under the appropriate CPI Method results in manageable increases in Peru's debt-to-GDP ratio and debt service costs. Moreover, Peru would likely benefit from curing its selective default with a lower cost of debt and an improvement in international financial market participants' view of its institutional strength.

Sebastian Edwards

June 2, 2016

[147] **CE-20**, Standard & Poor's, Supplementary Analysis: Republic of Peru, September 30, 2015.

[148] **CE-21**, Moody's Investors Service, FAQs on Peru's Bonos de la Deuda Agraria, December 18, 2015.