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Education and Professional Qualifications

2017 Ph.D. Economics, Kingston University London
Thesis: Foreign Direct Investment, Privatization, Corruption, and Economic Growth in Egypt

2010 M.Sc. Economics, Queen Mary, University of London
Thesis: Can Macroeconomic Variables Explain Stock Prices Movements in Egypt? An Approach of Vector Error Correction Model

2008 M.Sc. Economics (Coursework), Faculty of Economics and Political Science, Cairo University
Thesis: Is Islamic Finance Wave Catching on in Egypt?

2007 B.Sc. Economics, Faculty of Economics and Political Science, Cairo University
Thesis: Factors Affecting Small and Medium Enterprises in Egypt

Professional Experience

2018- Economic Consultant, Macroeconomic Policy, Debt Sustainability and Forecasting Division, African Development Bank (Cote D'Ivoire)

- Conducting policy research and debt sustainability analysis in order to improve the Bank's macroeconomic surveillance and understanding of sovereign debt risk profile and the policy tools that regional member countries can deploy to contain debt distress
- Conducting macroeconomic analysis, modelling and forecasting to inform decisions made by the Bank's the regional member countries
- Providing cutting edge analytical support to Senior Management through timely and rigorous economic intelligence work
- Leading the production and dissemination of all the Bank's flagship publications and other knowledge products on Africa's emerging macroeconomic and development issues, and on the Bank's High 5s priority areas

2012- Senior Economist, Investment Policy Advocacy, General Authority for Investment and Free Zones, Ministry of Investment and International Cooperation (Egypt)

- Contribute to advising the President of Egypt on the formulation international economic policy
- Responsible for negotiating and allocating the potential finance and technical assistance of the USAID to enhance the investment climate in Egypt
- Serve as a regional expert in monitoring and evaluating process of the USAID trade and investment programs in Egypt
- Provide specialist advice in investment policy advocacy, with a focus on Egypt-USA relationships
- Coordinate with pertinent donor agencies that provide technical assistance to the private sector businesses and SMEs, most importantly the USAID, the WB and the UNCTAD

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- Provide reliable and robust economic research and advice on investment policy issues, applying rigorous econometric models and statistical tools
- Work on the research design, implementation and analysis related to investment-associated impact evaluations, supporting evidence-based policy-making on the Ministry side
- Identify the country's priority sectors for investment promotion, potential investors in each sector, and competing countries for inward investment and opportunities for bilateral investment
- Step up private sector dialogue to improve the country's investment climate and business environment
- Draft speeches, discussion points, presentations and policy briefs for the Authority's Executive Director and Minister
- Regularly serve on task forces which determined program-related change including, revision of data collection manuals and materials

2010-2012 Investment Specialist, Technical Office of the Minister, Ministry of Investment and International Cooperation (Egypt)

- Contribute to advising the President of Egypt on the formulation international economic policy to enhance cooperation with the USA and Brazil
- Draft speeches, discussion points, presentations and policy briefs for the Minister
- Handle investor complaints addressed to the Minister
- Strengthen cooperation with international organizations, most importantly the WB, the USAID, and the OPIC
- Conduct diagnostics to assess the current state of the investment climate for formal and informal firms, the impact of recent reforms, and the factors influencing productivity and investment
- Provide advice on investment policy priorities, impact evaluations of policy initiatives, and political strategy and tactics especially in relation to the USA
- Prepare material to be used for the Minister's domestic and international meetings in cooperation with the Prime Minister's Office and other individual ministries
- Review and upgrade publications issued on the investment environment in Egypt

2008-2010 Economic Analyst, Technical Office of the Minister, Ministry of Investment and International Cooperation (Egypt)

- Draft speeches, discussion points, presentations and policy briefs for the Minister
- Handle investor complaints addressed to the Minister
- Implement investment promotion measures, and disseminate investment statistics
- Plan and coordinate several policy initiatives, most importantly the country's voucher privatization program
- Collect and analyze economic datasets, and undertook investment related research assignments, to advise the Minister on investment policy
- Organize launch events, press releases and presentations

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- Construct the first database of daily establishments of companies for the country's total investment
- Monitor investment data through monthly reports and forecast movements
- Furnish legislative proposals of the country's National Democratic Party
- Organize launch events, press releases and presentations

2007-2008 Economic Analyst, El-Mal Journal (Egypt)

- Research and analyze the economic situation of Egypt and the MENA region
- Work closely with a team of researchers in writing articles in the fields of Economic Policy and Economic Development
- Contribute to the preparation of monthly macroeconomic reports for multinational clients

2006 Economic Researcher, Mubasher International for Securities (Egypt)

- Assist in the creation of the company's knowledge base
- Conduct research, prepare reports, and formulate plans to address economic problems related to Egypt's stock market
- Interpret and forecast market trends

2006 Assistant Private Banker Intern, Bank Guarantees and Letters of Credit Department, Export Development Bank, Egypt

2005 Assistant Private Banker Intern, Credit Department, Qatar National Bank, Egypt

Research Interests

Foreign Investment and Economic Growth in Developing Countries, Privatization and Corruption, Portfolio Investment and Economic Growth

Peer-Reviewed Publications (Forthcoming)

2020 Eman Moustafa, 2020. "Foreign Direct Investment and Corruption in Egypt: A Cointegration Analysis," Working Papers, Economic Research Forum.

Morsy H. and E. Moustafa (2020), Mispricing of sovereign risk and herd behavior in African debt markets, Working Paper, African Development Bank, Abidjan, Côte d'Ivoire.

Non-Peer-Reviewed Publications

2010 Can Macroeconomic Variables Explain Stock Prices Movements in Egypt? An Approach of Vector Error Correction Model

2009 Is Islamic Finance Wave Catching on in Egypt?

2009 Progress Report, Cairo: Ministry of Investment and International Cooperation (Joint annual publication)

2008 Decentralization in India - Case Study

2007 Factors Affecting Small and Medium Enterprises in Egypt

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2007 Factors Affecting the Egyptian Stock Exchange

2007 The Effect of Mergers and Acquisitions on Employment

2006 Country Profile of Syria

2005 Mergers and Acquisitions

2004 Arab Israeli Conflict

Scholarships and Awards

2016 Ph.D. Economics Bursary
Kingston University London, UK

2015 Ph.D. Economics Bursary
Kingston University London, UK

2009 Scholarship for M.Sc. studies
El-Masry Foundation for Community Services, Egypt

2009 M.Sc. Economics Bursary
Queen Mary University of London, UK

Language and Computer Skills

Arabic (mother tongue), English (fluent), French (basic)

Microsoft Office, EViews, Stata, Adobe Photoshop, and Management Scientist Program

Mispricing of sovereign risk and herd behavior in African debt markets

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Abstract

In light of the limited evidence on herd behavior in frontier debt markets, this paper examines if African sovereign risk is mispriced due to international investor herding and discrimination rather than poor macroeconomic fundamentals. Exploiting high frequency financial datasets of 55 countries between 2004 to 2019, we estimate several regression specifications and apply the Blinder-Oaxaca decomposition approach to reflect the determinants of sovereign risk pricing in Africa compared to other world regions. The results confirm an asymmetric and herd behavior in African debt markets and verify that African debt assets are treated as one category or class. Our results also indicate that the mispricing of Africa's sovereign risk is mainly due to a discriminatory behavior by international investors rather than differences in the quality of macroeconomic fundamentals between Africa and non-Africa regions. The findings of this paper suggest that the market sentiment has largely moved Africa's debt market over the last decade.

JEL Classification: G12; G14; G15
Keywords: Herding, contagion, mispricing, CDS spreads, bond yields, sovereign risk, sovereign debt, Africa

1. Introduction

A new wave of external borrowing by African governments is there. Despite the need to borrow to finance its massive investments in development-supporting infrastructure, Africa's recent borrowing trends can come with the risk of crises for some African countries (Lane, 2012; Arteta and Hale, 2008), which can possibly be contagious to others in the continent. If this is the case, the continent will be treated as one asset class, leading to a mispricing of its sovereign debt, especially if the macroeconomic fundamentals, which theoretically explain sovereign debt conditions, have been generally improving if compared to the pre-2000 levels (see AfDB, 2019 and IMF, 2019).

As such, the hypothesis we seek to test is that African debt assets are mispriced and treated as one category or class, compared to a case where the pricing of the assets is based on macroeconomic fundamentals. This mispricing may arise from international investors' herding behavior against Africa due to stronger asymmetric information, lack of adequate resources to analyze economic fundamentals due to market size, or institutional reasons such as geographic heuristics for diversification.

Over the last decade of strengthened macroeconomic fundamentals, reflected by high average exports and GDP growth, many African countries became less risky when it comes to borrowing. Nevertheless, African governments still have to pay higher premium to issue sovereign bonds, estimated in the neighborhood of 2.9 percentage points after controlling for the cost of issuance and macroeconomic fundamentals (see Olabisi and Stein, 2015). Hence, there is a need to understand the role of international herding against Africa in this phenomenon. Also, the cost of buying insurance against defaults on Africa's frontier market sovereign debt, measured by the credit default swap (CDS) spreads, has been widening in the last 10 years. These higher premia and widening bond and CDS spreads suggest that the assessment of the market (including investors and creditors) of the credit risks, country-specific risks, and asset class-wide risks for Africa's sovereign bonds have been worsening in spite of the improving fundamentals in real macroeconomic indicators. This contrasting link is inconsistent with the received knowledge from efficient market hypothesis, according to which rational investors have a strong incentive to exploit all the available information in the market. Thus, asset prices should always reflect the information

publicly available, where yield differentials of bonds issued by different sovereigns should reflect differentials in macroeconomic fundamentals (see Ferrucci, 2003).

On the other hand, as we move away from the efficient market hypothesis, it might well be that it is imperfect information about African economies that may be causing distortions in the way African sovereign debt is priced. Because the information required to assess sovereign risk for a country is costly to acquire and process, investors might prefer to simply practice herding. And when investors herd, they fail to update the risk premia to reflect changing macroeconomic conditions, which disproportionately impacts the prices of a particular debt asset. In addition, the allocation of funds across countries and new information about one country could lead investors to revise their prospects for other countries with superficially similar characteristics (see Calvo and Mendoza, 1996; Beirne and Fratzscher, 2013). In short, herding behavior by investors can lead to informational frictions at the margin, where investors assess the sovereign risk of countries whose fundamental credentials are bleak or unattractive based on other countries with similar characteristics. Our proposition is that the pricing of African sovereign debt risks, as measured by the bond yields and the CDS spreads have been subject to "bubbles"- that is, to movements that are disassociated from the underlying fundamentals in the region.

A range of previous papers has analyzed the determinants of the pricing of sovereign risk. Earlier studies tended to focus on government bond yield spreads as the reference measure for sovereign risk, and also on explaining sovereign risk in emerging and developing economies (Ferrucci, 2003; Eichengreen and Mody, 1998; Presbitero et al., 2016; McGuire and Schrijvers, 2003; Baldacci and Poghosyan, 2012). A seminal study by Edwards (1985) of the factors driving government bond spreads found that domestic macroeconomic fundamentals were important determinants of sovereign risk price, including factors such as the public debt, foreign reserves, the current account balance and inflation. In addition to these fundamentals, Eichengreen and Mody (1998) identified the external interest rate environment as an important determinant of sovereign spreads. More recent work also examined sovereign CDS spreads and its determinants in developed and emerging economies (Fontana and Scheicher, 2016; Dooley and Hutchison, 2009; Remolona et al., 2008).

Although the literature on sovereign risk pricing appears voluminous, few studies report on the mispricing of the sovereign debt and herding contagion between developed and emerging economies (Beirne and Fratzscher, 2013; Grauwe and Ji, 2012; Aizenman et al., 2013; Longstaff et al., 2011). Aizenman et al. (2013), focusing on the pricing of sovereign risk for 60 economies based on CDS spreads, found evidence of mispricing in the European arena relative to the macroeconomic fundamentals of public debt, fiscal balance, trade openness, external debt, inflation and the TED spread.

In sum, most of the available evidence on sovereign risk pricing is drawn from developed and emerging economies, whereas evidence from developing countries, particularly Africa, remains scant. This paper fills the gap in the literature by answering two fundamental questions. First, is there evidence of contagion and herding behavior by international investors in Africa's debt markets, treating Africa as one asset category. And, if yes, what is the nature of this herding behavior? Is it asymmetric? And, from which regions? Second, to what extent is the pricing of Africa's sovereign risk subject to bubbles- that is, have financial markets been mispricing Africa's sovereign risk as measured by the dynamics of bond yields and CDS spreads?

2. Conceptual framework

There are two polar views of analyzing investment behavior and financial market participation: the traditional and the behavioral finance views. According to the traditional framework for finance, the efficient market hypothesis (EMH) and its implications is a keystone. In an efficient market, prices fully reflect all available information. Investors therefore cannot use investment strategies to beat the market in the long run. The EMH is based on arguments about investor rationality and arbitrage. First, investors in financial markets are assumed to be rational. And even if some investors are not rational, prices will not be affected because their trades are random and cancel each other out. Second, if investors are irrational in similar ways, arbitrageurs will eliminate the impact on prices. The empirical evidence researchers found in the 1970s was consistent with the EMH. Thus, it became both a theoretical and empirical success.

In the 1980s however, several empirical findings were not consistent with the efficient market theory (Shefrin and Statman, 2000). For example, the efficiency of security prices has been

challenged by, among others, De Bondt (2009) who suggests that stocks with high price-to-earnings ratios (PE) are overvalued and stocks with low PE ratios are undervalued. In response to the anomalies found and the difficulty of traditional financial models based on the EMH to explain these anomalies, a new field of finance emerged, namely behavioral finance, which became one of the most important research fields and challenges the EMH (Shiller, 2003). According to Barberis and Thaler (2003), the field of behavioral finance rests on two building blocks: limits to arbitrage and psychology. They assume that real world arbitrage is accompanied by both risks and costs. As a result, a mispricing in the financial market may remain unchallenged. This stands in sharp contrast to the EMH which relies heavily on the ability of arbitrageurs to eliminate mispricing in the financial market. In the aftermath of several stock crises, to name a few, the stock market crash of 1997, the Asian crisis of 1997, the dot-com bubble of 2000s and the financial crisis of 2008, empirical puzzles are not easily understood based on the traditional EMH models. The consensus among investors in financial markets appears to be low, localized but not based on private information. This implies that independent decision-making across all investors is not a reasonable assumption.

We will extend this debate further to account for the neoclassical income convergence hypothesis, the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT). We will also present an illustrative framework that demonstrates how the price of sovereign risk is determined and use this framework to motivate the formulation of the empirical strategy. The conventional approach to modelling equilibrium sovereign yields follows the seminal paper by Mora (2006) which assumes that the spread of a bond over a risk-free interest rate is a function of the probability that a country would default and that the loss to the creditor is contingent on default. Typically, this probability of default is exogenously determined (for example, within the IMF-World Bank's Debt Sustainability Framework) based on the sustainability of the trajectory of external debt as a ratio of both solvency (for example, GDP) or liquidity indicators (for example, revenue or export earnings).

3. Methods and data

3.1 Baseline specification

In behavioral finance, primarily there are two categories of methodologies to detect herding. First, institutional herding which is based on the observed investment behavior of a specific category of investors be they individual investors or a group of investors. Co-movement in their observed investment pattern is termed as herding. Second, market-wide herding methods focus on detection of herding at the market level rather than investors level. The first method requires the detailed information of every transaction done by the selected category of the investors that generally suffers from misidentification of investors or infrequent data observations. The approach of this paper is to detect market-wide herding. This form of herding arises when investors in the market ignore the individual characteristics of stocks and instead follow the performance of the market.

Christie and Huang (1995) and Chang et al. (2000) have proposed methods to detect market-wide herding using cross sectional data of stock returns. Christie and Huang (1995) suggest that herding will be more prevalent during periods of market stress, which is defined as the occurrence of extreme returns in a market portfolio. Individual stock returns under these conditions tend to cluster around the overall market return as individuals tend to suppress their own private information, and their investment decisions are more likely to mimic collective actions in the market. They argue that rational asset pricing models would predict the relation between dispersions in individual assets and that the market return would be linear. This means that the dispersions are an increasing function of the market return. To measure the return dispersion, Christie and Huang (1995) propose the cross-sectional standard deviation (CSSD) method, which is expressed as:

$$CSSD_t = \sqrt{\frac{\sum_{i=1}^{N}(R_{i,t}-R_{m,t})^2}{(N-1)}}, \quad (1)$$

where N is the number of assets, $R_{i,t}$ is the return of asset i t time t, and $R_{m,t}$ is the cross sectional average return of N assets at time t. Since the $CSSD_t$ is calculated by squared-return deviations, it tends to be sensitive to market outliers. In a later study, Chang et al. (2000) propose the cross-sectional absolute deviation CSAD which they base on the conditional version of the CAPM, to be as follows:

$$CSAD_t = \frac{1}{N}\sum_{i=1}^{N} \left|R_{i,t} - R_{m,t}\right|, \quad (2)$$

Hence, the presence of herd behavior in the market would not only imply a decrease in dispersions but also a non-linear relation between the dispersions and the market return. This means that the dispersions will decrease or at least increase at a less-than-proportional rate with the market return. Chiang and Zheng (2010) modified the specification of Chang et al. (2000) and calculate CSAD as follows:

$$CSAD_t = \gamma_0 + \gamma_1 R_{m,t} + \gamma_2 |R_{m,t}| + \gamma_3 R_{m,t}^2 + \epsilon_t \quad (3)$$

The empirical approach of this paper is based on the work of Chiang and Zheng (2010) with one addition to the method of Chang et al. (2000). Chiang and Zheng (2010) include an additional term on the right-hand side of equation (3) to take care of asymmetric investor behavior during different market conditions. As mentioned previously, herd behavior is assumed to be more likely to occur during periods of relatively large market movements. This will be implied by a non-linear relationship between CSAD and the equally-weighted market return. Therefore, a non-linear term ($R_{m,t}^2$) is included in the model. The presence of investor herds will imply that CSAD decreases or at least increases at less-than-proportional rate with the market return. Thus, market-wide herding is consistent with a negative and statistically significant value of the coefficient γ_3 of $R_{m,t}^2$.

3.3 Contagion and herding spillover effects

In order to test for contagion and herding spill-over effects, we follow the methodology of Chiang and Zheng (2010) to compare international herding evidence against Africa to against each region of other world regions. Specifically, equation (3) is augmented by adding the squared return of debt market in region and/or country j and time t to the regression. Accordingly, the contagion and spillover equation is given by:

$$CSAD_t = \gamma_0 + \gamma_1 R_{i,m,t} + \gamma_2 |R_{m,t}| + \gamma_3 R_{j,m,t}^2 + \epsilon_t \quad (4)$$

where $R_{j,m,t}^2$ is the squared return from another regional or country market, j. The coefficient γ_3 is

expected to be negative and statistically significant if events in one market induce herding behavior in another. Additionally, the specification in equation (4) allows us to account for asymmetric investor behavior under different market conditions and to capture whether herding against Africa is more persistent than against other world regions.

3.4 Decoupling the drivers of sovereign spreads

Drawing from Beirne and Fratzscher (2013) and De Grauwe and Ji (2012), we extend the sovereign risk pricing framework to estimate a standard panel regression model with country- and time-fixed effects, as follows:

$$S_{it} = \alpha_0 + \alpha_i + \beta_1 X_{i,t} + \gamma_1 R_{j,t} + \epsilon_{i,t} \quad (5)$$

where S_{it} is the price of sovereign risk. We analyze two separate financial prices of sovereign risk: the government bond yield spreads (relative to a benchmark rate we will discuss later) and sovereign CDS spreads. Macroeconomic fundamentals are captured by the vector $X_{i,t}$ which includes several indicators of economic solvency and liquidity (see section 4). Country-fixed effects are captured by α_i. R_{jt} is the regional price of sovereign risk for the region in which country i is located, excluding country i itself. This can be thought of as the contribution of changes in market sentiment, i.e., in the way the markets regard the credit worthiness of African countries with given characteristics. The coefficient reflects the changes in market sentiment toward African countries with given macroeconomic characteristics. Intuitively, a rising negative coefficient of R_{jt} suggests that the market is growing more discriminating.

The regional price of risk is computed as an unweighted average of the price of sovereign risk in other regional economies. However, our regional classification is not coinciding with the classifications used in emerging markets typical bond indices such as: The JP Morgan EMBI and the Bloomberg African Development Bank AFMI index. Therefore, we equally weight regional price averages. In the next section, we explain how to detect the mispricing of sovereign risk in Africa.

3.5 Detecting mispricing and contagion in sovereign risk: Oaxaca decomposition

Theoretically, from the empirical specification in equation (5), there are four possible sources of mispricing in sovereign risk. First, financial markets price economic fundamentals differently between regions. Debt markets are more sensitive to the quality of a set of fundamental characteristics in Africa than in other regions- a phenomenon often referred to as the fundamental contagion. Second, creditors are treating African debt markets as one asset class. Hence, there would be an intensification in the cross-country regional transmission of sovereign risk as markets respond to changes in observable and unobservable factors in neighbor countries in the region- we refer to this as herding contagion. The third source is the country-specific fixed effects, α_i. There are many possible interpretations of these effects, yet the most plausible one in the context of our study is country risk premia. The fourth source of mispricing is the unsystematic component of equation (5), i.e., the residuals. Residuals can provide information about herding contagion across countries at certain points in time. Herding contagion can be identified by scanning the clusters in the residuals. Particularly, if positive residuals are found simultaneously in several countries, and the countries are substantially clustering with dramatically unexplained increase in sovereign risk pricing, then, a pure herding contagion is identified[1].

A rise in sovereign spreads can adversely affect investor confidence and other macroeconomic fundamentals. Therefore, our model emphasizes whether the price of sovereign risk is strictly exogenous to the fundamentals included in the vector X_{it} of equation (5). If such mechanism does exist, then it would only materialize after some period lags. Our approach is to additionally estimate dynamic versions of equation (5) and to conduct diagnostic tests to determine if our exogeneity assumption is valid.

To empirically quantify the extent of mispricing and discrimination against African debt markets, we apply the Oaxaca-Blinder decomposition approach. The Oaxaca decomposition will allow us to decouple mispricing in African debt markets relative to other regions and to pin down the contribution of country-specific fundamentals versus regional factors in explaining the so-called "Africa premia". In the following debt pricing equations, f and nf represent African debt market and any non-African regional debt market, respectively.

[1] See similar applications in Beirne and Fratzscher (2013) and Boyson et al. (2010).

$$S_{it}^{f} = \alpha_0^f + \alpha_i^f + \beta_1^f X_{it}^f + \gamma_1^f R_{jf}^f + \epsilon_{it}^f$$
$$S_{it}^{nf} = \alpha_0^{nf} + \alpha_i^{nf} + \beta_1^{nf} X_{it}^{nf} + \gamma_1^{nf} R_{jf}^{nf} + \epsilon_{it}^{nf} \quad (6)$$

Then, the gap or mispricing in the average spread of an African relative to a non-African market is represented as follows:

$$S_{it}^{f} - S_{it}^{nf} = \alpha_0^f + \alpha_i^f + \beta_1^f X_{it}^f + \gamma_1^f R_{jf}^f - (\alpha_0^{nf} + \alpha_i^{nf} + \beta_1^{nf} X_{it}^{nf} + \gamma_1^{nf} R_{jf}^{nf}) \quad (7)$$

By adding and subtracting $\beta_1^f X_{it}^{\mathrm{nf}}$ and $\gamma_1^f R_{jf}^{\mathrm{nf}}$, respectively, to and from equation (7), we obtain the Oaxaca-Blinder decomposition as follows:

$$S_{it}^{f} - \mathrm{S}_{\mathrm{it}}^{\mathrm{nf}} = (\alpha_0^f - \alpha_0^{\mathrm{nf}}) + (\alpha_i^f - \alpha_i^{\mathrm{nf}}) + \beta_1^f (X_{it}^f - X_{it}^{\mathrm{nf}}) + \gamma_1^f (R_{jf}^f - R_{jf}^{\mathrm{nf}}) + (\beta_1^f - \beta_1^{\mathrm{nf}}) X_{it}^{\mathrm{nf}} + (\gamma_1^f - \gamma_1^{\mathrm{nf}}) R_{jf}^{\mathrm{nf}} \quad (8)$$

The terms of equation (8) capture the following, respectively: differences in the mean values of spreads between Africa and other regions; averages of Africa premia over other regions; mispricing due to differences in the average quality of macroeconomic fundamentals between Africa and non-African regions; and investor discrimination and mispricing in African debt markets relative to other regions. Differences between the βs and the γs represent the discriminatory component of financial markets regarding the credit worthiness of African sovereign debt instrument compared to countries with similar economic characteristics in other world regions.

4. Data and stylized facts

4.1 Sovereign debt pricing

This section discusses the choice of data and presents some stylized facts on the evolution of sovereign risk pricing in Africa over the past decade. A first crucial issue is the definition of sovereign risk. Our approach is to analyze how financial markets price sovereign debt risk. More specifically, we analyze two separate financial prices of sovereign debt risk: the daily closing

prices of sovereign CDS spreads and government bond yield spreads. The two financial prices reflect the additional borrowing cost that an African country has to bear in international financial markets relative to the risk-free country and the level of indebtedness associated with the probability of default.

All the sovereign CDSs and bond issues used for the analysis are of 10-year maturity and denominated in developed country currencies (typically in U.S. dollars).[2] CDS spreads have several advantages compared to sovereign bond spreads. Several studies showed that CDS spreads tend to lead bond spreads in price discovery (Alper et al. 2013, Gyntelberg et al. 2013, and Coudert and Gex 2010). CDS spreads are also available for fixed maturities and taking credit risk positions via CDS necessitates less funding liquidity. The lead of the sovereign CDS market only holds for high-yield emerging and developing countries. However, the sovereign bond market still leads in low-yield countries such as Germany, France and Austria.

Our empirical analysis is conducted for a sample set of 55 countries: 17 African, six Latin American, eight Asian, 15 developed European, five developing European, and four other developed countries.[3] The selected countries were dictated by such factors as data availability and size of country in regional market. The sample period extends from 1 January 2004 to 30 September 2019. All data are available from Bloomberg and DataStream International.

Table 4.1 reports the statistical properties of the daily CDS spreads (column (1)) and government bond yield spreads (column (2)) for each region in the sample markets, for the period between 1 January 2004 to 30 September 2019. During the period under scrutiny, almost all developing, emerging and frontier markets have higher average bond returns than the developed ones. The highest returns are recorded for Latin America and Africa. The volatility levels of the developing, emerging and frontier markets are generally higher than the volatility of the developed regions.

[2] We also considered using bonds issued in local currencies to establish baseline costs estimates, but unfortunately there is no reliable data on CDS and bonds issued in local currency for all countries in our sample.

[3] 17 African (Algeria, Angola, Cameroon, Côte d'Ivoire, Egypt, Ethiopia, Gabon, Ghana, South Africa, Kenya, Morocco, Nigeria, Namibia, Rwanda, Senegal, Tunisia, Zambia), six Latin American (Argentina, Brazil, Chile, Colombia, Mexico, Peru), eight Asian (China, India, Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam), 15 developed European (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, Switzerland, United Kingdom), five developing European (Bulgaria, Hungary, Poland, Russia, Turkey), and four other developed countries (Australia, Japan, New Zealand, United States).

The least volatile markets are Australia, Japan, New Zealand, and United States, with a standard deviation of (32.7), and (1.9) in CDS and bonds markets, respectively. In general, the distributions of debt market returns are statistically non normal, leptokurtic and show positive skewness.

Table 4.1: Descriptive statistics for daily sovereign CDS and government bond yield spreads

	Obs.		Mean		Median		Std. dev.		Skewness		Kurtosis	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Africa	25,063	20,655	270.897	4.765	225.930	4.326	174.359	3.063	1.391	1.585	6.321	8.979
Latin America	22,681	9,928	372.129	7.918	182.705	6.569	688.926	3.342	5.639	1.494	42.831	3.184
Asia	25,302	20,655	187.664	6.403	176.093	4.869	100.894	3.475	1.647	1.039	9.829	33.117
Developed Europe	52,831	69,007	182.311	3.444	53.000	3.68	854.819	2.553	15.160	3.598	281.229	3.293
Developing Europe	19,139	14,171	204.336	6.215	192.660	6.046	123.999	2.842	0.973	0.425	5.029	1.792
Other Developed	12,364	19,979	58.802	3.527	55.000	3.454	32.744	1.966	1.037	0.051	4.881	5.046

Notes: The Table presents descriptive statistics for daily log clean price changes for the 10 year CDS spreads (1) and government bond yield spreads (2) for each region in the sample markets, for the period between 1 January 2004 to 30 September 2019. All data are available from Bloomberg and DataStream International.

4.2 Macroeconomic factors and global market uncertainty

Consistent with the factors highlighted in the literature, the analysis also includes the overall state of the economy measured by GDP growth and real per capita GDP. These macroeconomic factors capture a country's economic activity and growth.

The set of variables in X (equation 6) also contains domestic economic fundamentals indicating country default risk or creditworthiness. Sovereign debt indicators are government debt/GDP, external debt/GDP, current account/GDP, imports, inflation, reserves, fiscal balance/GDP and investment/GDP. Dailami et al. (2008), Aizenman et al. (2013), Riedel et al. (2013), Kennedy and Palerm (2014) and Amstad et al. (2016) are among the studies finding that domestic fundamentals are significant in determining sovereign spreads in developing economies. High government debt ratios, high inflation, poor investments, low trade surpluses (high deficits), and low foreign reserves are all expected to predict high interest rates on sovereign debt spreads.

In the literature, the set of variables in X (equation 6) contains industrial country (mainly U.S.) interest rates or the Fed target rate to proxy global liquidity and some alternative measures,

including high yield corporate bonds in advanced economies, to capture global risk appetite or financial conditions. Increases in international interest rates are expected to increase developing, emerging, and frontier markets default probability and risk premium, decrease the demand for risky assets and consequently increase sovereign spreads. The results by Gonzalez-Rozada and Levy Yeyati (2008), Özatay et al. (2009) and Banerji et al. (2014) suggest that sovereign default risks and thus spreads in developing, emerging and frontier markets are significantly triggered by global financial conditions proxied by a subset of variables including foreign exchange and LIBOR rates. We consider 3-month USD LIBOR rate to proxy global liquidity conditions.

Macroeconomic fundamentals data is collected from the World Bank's World Development Indicators (WDI) and the International Monetary Fund's International Financial Statistics (IFS). We used three indicators (Bloomberg Night-Time Lights Index (NLI), Industrial Production Index (IPI), and Institutional Investor's Country Credit ratings (IIR)) to transform quarterly data into monthly format. To account for heterogeneity in the relationships across countries, we conduct our estimation and analysis for the entire sample and for sub-region categories of countries, distinguishing in particular between countries based on their rating according to the IMF/World Bank debt sustainability framework.

5. Results and discussion

5.1 Baseline estimates of contagion and herding effects

We initially investigate if there is an evidence on herd behavior in African sovereign debt markets and test for contagion and herding spill-over effects to compare herding evidence against Africa versus against other world regions. Table 5.1 presents the results of the baseline herding and contagion regressions in all regions of our sample. In order to test the sensitivity of results to the choice of the aggregate portfolio, each of equations (3) in column one and (4) in columns two to six is estimated twice: first, for the CDS market (see panel A) and second, for the bond market (see panel B). The table represents the contagion and international herd behavior in each region in the sample markets. Recall that a negative and statistically significant value of the coefficient γ_3 of $R^2_{m,t}$ in the first column is consistent with herding and that γ_3 in the next five columns is negative and statistically significant if herd behavior against Africa is present.

The evidence in Table 5.1 shows a significant evidence of market-wide herding in Africa during the entire time frame and at the conventional levels compared to other world regions (see first column). This result could be perceived as consistent with the results of other studies (e.g. Chiang and Zheng, 2010; and Hwang and Salmon, 2004) showing evidence of herding in developing, emerging and frontier economies. Results in the next five columns provide evidence of contagion and herding spill-over effects from Australia, Japan, New Zealand, and United States to African sovereign CDS market. The same seems to be the case for Asian, and developed and developing Europe towards African sovereign bond market. This asymmetric investor behavior implies the existence of herding or adverse herding effects and proves our initial hypothesis that African debt assets are treated as one category or class. Henceforward, the question is: why investors treat African debt assets as one category? Is it rational herding against accurate analysis of macroeconomic fundamentals or spurious herding and misperception due to stronger asymmetric information in the case of Africa?

Table 5.1: Results of overall contagion and herding regressions

	Africa	Latin America	Asia	Developed Europe	Developing Europe	Other Developed
Panel A: CDS Market						
Intercept	6.261***	17.556***	8.195***	7.498***	10.127***	8.888***
	(0.078)	(0.061)	(0.109)	(0.009)	(0.065)	(0.077)
γ_2	0.868***	-0.058***	-0.462***	0.009***	0.413***	0.379***
	(0.022)	(0.010)	(0.032)	(0.001)	(0.015)	(0.016)
γ_3	**-0.026*** **	0.003***	0.123***	0.000***	0.003***	-0.002***
	(0.001)	(0.000)	(0.002)	(2.420)	(0.001)	(0.000)
Adjusted R^2	0.598	0.734	0.520	0.380	0.214	0.844
Panel B: Bond Market						
Intercept	1.678***	10.771***	13.209***	2.556***	9.054***	25.837***
	(0.282)	(0.142)	(0.138)	(0.014)	(0.089)	(0.245)
γ_2	0.035***	0.307***	0.851***	0.277***	0.968***	0.162***
	(0.035)	(0.021)	(0.019)	(0.002)	(0.019)	(0.059)
γ_3	**-0.011*** **	0.001***	-0.006***	-0.002***	-0.012***	0.015***
	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.003)
Adjusted R^2	0.808	0.187	0.130	0.264	0.204	0.158

Notes: The Table presents the results for equations (3) in column one and equation (4) in columns two to six. $CSAD_t$ is the Cross Sectional Absolute Deviation of returns at day t, when the market return is positive. γ_2 is the coefficient of the absolute value of the positive market portfolio return at day t and γ_3 is the coefficient of the squared positive market return at day t in column one and the squared return from another regional or country market in columns two to six. In Panel A, the first section presents the results when the CSAD measure is estimated from the CDS markets. In order to test the sensitivity of results, Panel B presents the results when the CSAD measure is estimated from the bond markets. Standard errors appear in parentheses. ***, **, *: level of significance respectively at the 1%, 5% and 10%. Bold cases denote negative and statistically significant herding coefficients at the 1% level.

These central questions should be imposed in the literature on sovereign risk pricing in Africa. If lower government and external debt ratios, faster GDP growth rates, and fewer restructurings can

explain the change in African sovereign risk pricing that occurred over the last 10 years, then there is a reason to be relatively sanguine about the market's debt pricing behavior. If, on the other hand, the changes in African sovereign risk pricing are encouraged by a not otherwise explicable shift in behavior, then there is no a priori reason to rule out spurious herding behavior against Africa.

5.2 Decomposition estimates of the sovereign spreads drivers

Table 5.2 presents the results from estimating equation (5), i.e., of testing whether the fundamental macroeconomic information announcements or the changes in market sentiment are inducing herding behavior against Africa compared to other regions. The results are quite satisfactory, both from the perspective of the signs and from the level of significance of the coefficients. It is important to stress, nonetheless, that between the two types of sovereign risk– bond spreads, and CDS spreads, a similar story prevails regarding the determinants of the price of sovereign risk. The empirical evidence generally shows a plausible and intuitive link between macroeconomic fundamentals, changes in market sentiment, and sovereign risk pricing– with higher government and external debt, lower GDP growth and real per capita GDP, worsening fiscal and current account balances, lower reserves, and volatile market sentiment all being associated with higher sovereign risk price in debt markets. However, there are plausible cross-region differences in these links.

As discussed earlier, Rj reflects the changes in sentiment as African debt markets come into or fall out of favor. In Table 5.2, Rj is suggesting a growing more discriminating market against Africa. It is even clearer in the bond market that Africa's sovereign risk pricing is more sensitive– with the largest coefficient across regions (-0.989) to market sentiment than in the CDS market (-0.347). Then comes Latin America, with a slightly more sensitive CDS market (-0.039).

A second compelling finding relates to changes over time in the relationship between fundamentals and sovereign risk pricing. In general, the empirical evidence shows that the international market tends to take into account specific economic characteristics of the borrowing countries. As observed in most of the regressions, the government debt/GDP and external debt/GDP ratios are significantly positive and smaller than one. This result suggests that a higher level of indebtedness is associated with a higher probability of default and thus, a higher sovereign risk price.

Table 5.2: Results of the sovereign spreads drivers

	Africa	Latin America	Asia	Developed Europe	Developing Europe	Other Developed
Panel A: CDS Market						
GDP growth	-0.017***	-0.041**	-0.001	-0.054**	-0.002	0.007
	(0.007)	(0.014)	(0.005)	(0.017)	(0.014)	(0.005)
Real per capita GDP	-0.000***	-0.371***	-0.160**	-0.718**	-0.095	-0.003
	(0.000)	(0.047)	(0.063)	(0.407)	(0.462)	(0.043)
Government debt/GDP	0.000	0.011***	0.015***	1.034**	0.001*	0.000
	(0.001)	(0.001)	(0.002)	(0.381)	(0.000)	(0.000)
External debt/GDP	0.002	0.006**	0.001	-0.162	-0.115	-0.011
	(0.005)	(0.003)	(0.004)	(0.115)	(0.097)	(0.009)
Current account/GDP	-0.006*	-0.010**	0.003	-0.055**	0.006	0.020
	(0.003)	(0.005)	(0.003)	(0.021)	(0.013)	(0.012)
Imports	0.003***	0.004***	0.009*	0.002**	0.013***	0.003
	(0.001)	(0.001)	(0.005)	(0.000)	(0.003)	(0.003)
Inflation	0.014***	0.011*	0.007	-0.019**	0.017*	0.002
	(0.003)	(0.005)	(0.006)	(0.009)	(0.010)	(0.019)
Reserves	0.000	-0.266***	-0.005	0.131***	-0.135**	-0.128**
	(0.000)	(0.025)	(0.019)	(0.029)	(0.074)	(0.048)
Fiscal balance/GDP	-0.011*	-0.062***	-0.004**	-0.041**	0.003	-0.019
	(0.006)	(0.004)	(0.002)	(0.016)	(0.009)	(0.010)
LIBOR	0.009**	-0.031***	-0.033***	0.004	0.007	0.012
	(0.004)	(0.004)	(0.010)	(0.004)	(0.008)	(0.029)
Exchange rate	-0.001*	-0.027***	0.003**	0.034**	0.000	0.003**
	(0.000)	(0.004)	(0.002)	(0.014)	(0.000)	(0.001)
Investment/GDP	0.003	0.024***	0.004	0.001	-0.005	0.007
	(0.003)	(0.004)	(0.004)	(0.001)	(0.004)	(0.009)
Rj	**-0.347*** **	-0.039***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.014)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	694	799	669	112	148	297
Number of Countries	12	6	8	15	5	4
Panel B: Bond Market						
GDP growth	0.043	0.002	-0.013***	0.023	-0.501***	-0.044*
	(0.096)	(0.011)	(0.003)	(0.034)	(0.114)	(0.031)
Real per capita GDP	-0.000	0.000	-0.253***	-0.000**	-2.538**	0.000
	(0.000)	(0.000)	(0.049)	(0.000)	(1.297)	(0.000)
Government debt/GDP	0.007	0.000	0.000	0.034*	2.057***	0.008**
	(0.007)	(0.002)	(0.000)	(0.019)	(0.438)	(0.003)
External debt/GDP	0.701*	0.021***	0.013***	-0.025	-1.189	-0.049
	(0.420)	(0.009)	(0.002)	(0.048)	(1.417)	(0.096)
Current account/GDP	0.033	0.006	-0.008***	0.024	0.038	-0.311***
	(0.022)	(0.015)	(0.002)	(0.026)	(0.027)	(0.087)
Imports	-0.004	0.010	0.027***	-0.007	-0.325*	0.013
	(0.005)	(0.012)	(0.004)	(0.008)	(0.182)	(0.021)
Inflation	0.068***	0.054***	0.044***	0.251**	0.319***	0.006
	(0.016)	(0.008)	(0.005)	(0.115)	(0.027)	(0.114)
Reserves	-0.002**	-0.024	-0.138***	-0.532***	-0.014***	-0.446*
	(0.001)	(0.026)	(0.015)	(0.165)	(0.002)	(0.260)
Fiscal balance/GDP	-0.120***	-0.024***	-0.002**	-0.106	-0.063**	0.139
	(0.034)	(0.005)	(0.001)	(0.146)	(0.030)	(0.094)
LIBOR	-0.057***	0.022	-0.007	-0.085	-0.056*	0.803***
	(0.017)	(0.015)	(0.008)	(0.191)	(0.037)	(0.207)
Exchange rate	0.004*	-0.187**	-0.004***	0.044	-0.008***	0.015*
	(0.001)	(0.106)	(0.001)	(0.051)	(0.002)	(0.008)
Investment/GDP	-0.067	0.061***	0.007**	0.117**	0.191***	-0.251***
	(0.012)	(0.018)	(0.002)	(0.000)	(0.027)	(0.059)
Rj	**-0.989*** **	-0.027***	-0.000***	-0.000**	-0.000***	0.000
	(0.107)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	450	349	563	217	338	288
Number of Countries	17	6	8	15	5	4

Notes: The Table presents the results for equation (5). R_j is the regional price of sovereign risk. ***, **, *: level of significance respectively at the 1%, 5% and 10%. The numbers in the parentheses () are standard errors.

The coefficient of the reserves' ratios is, as expected, consistently negative when significant, indicating that the behavior of the reserves' ratios is always playing a role in pricing sovereign risk. These results are consistent with the findings of Gelos et al. (2011) and Olabisi and Stein (2015). This result is significant from a policy point of view; as African countries should be particularly careful while managing their international reserves to reduce their sovereign risk prices.

The coefficients of the current account/GDP, and fiscal balance/GDP are, as expected, negative when significant. This indicates that a higher deficit (or lower surplus) will result in a higher perceived probability of default. The coefficients of the GDP growth, real per capita GDP, imports, inflation, LIBOR and exchange rate are also, as expected, consistent when significant. Though, the estimated coefficient of the investment/GDP ratio is negative and significant as expected only in Australia, Japan, New Zealand and United States. This result suggests that in developed countries, as has been indicated by Edwards (1985), a higher propensity to invest will tend to be associated with a lower perceived probability of default.

In sum, the evidence presented in this section shows a discriminating behavior against Africa in determining its sovereign risk price and an underpricing of its macroeconomic fundamentals compared to other world regions. This discrimination suggests a mispricing of sovereign risk in African debt markets. To quantify the extent of this mispricing and the discrimination against African debt markets, we apply the Oaxaca-Blinder decomposition approach in the next section.

5.3 Decomposition estimates of sovereign debt pricing differential

The key message of Table 5.3 is that market sentiment is moving against Africa's sovereign debt pricing. Recall that the Blinder-Oaxaca decomposition decouples mispricing in Africa's sovereign debt markets relative to other regions and pins down the contribution of country-specific macroeconomic fundamentals versus regional factors in explaining Africa premia. Table 5.3 shows that in Africa, the mean of the sovereign debt price estimate is 5.485 in the CDS market and 1.391 in the bond market, compared to 4.769 in CDS marketd 1.333 in bond markets for non-Africa

regions. This yields a significant sovereign debt pricing differential of 0.7165 in the CDS market and 0.058 in the bond market.

In the first-row panel of Table 5.3, we report the sovereign debt pricing differential decomposed into three parts, reflecting the effect of the regional differences in endowments (explained effect), coefficients (unexplained effect), and their simultaneous effect on the pricing gap between Africa and non-Africa regions. The results of the three estimates indicate that the pricing gap is driven by differences in coefficients rather than endowments (see columns (1) and (3)). The significant overall increases of 0.208, and 1.125 in columns (1) and (3), respectively show that differences in coefficients account for all of the pricing gap.

Interestingly, we observe that the endowments of Africa with respect to GDP growth, external debt/GDP and exchange rate reduce the observed pricing gap. This is suggested by a higher endowment level of these variables for Africa as opposed to non-Africa regions (see columns (1) and (3)). The results also indicate that current account and fiscal balances, reserves and investment performance in Africa have the highest negative association with the sovereign risk pricing of the African debt, both in terms of significance and magnitude, as reflected by the reported coefficients of these variables in both CDS and bond markets. These findings suggest that Africa is more likely to benefit from the fiscal and investment policy reform programs, in terms of lower sovereign risk prices and default probabilities.

In general, Table 5.3 provides evidence that the change in the mean value of sovereign risk prices of Africa is larger than can be explained by the mean values of the macroeconomic fundamentals' variables alone. To be sure, improved country characteristics contribute to the decline in the pricing gap. But the share of the change attributable to these fundamentals is only a fraction of the total. On the contrary, the contribution of the changes in the unexplained coefficients is higher, indicating a general shift in market sentiment and discrimination against Africa. The combined effect was to increase the premium paid by African countries.

Table 5.3: Blinder-Oaxaca decomposition estimates of sovereign debt pricing differential

	Panel A: CDS Market		Panel B: Bond Market	
	(1)	(2)	(3)	(4)
OVERALL				
Non-Africa	4.769***		1.333***	
	(0.016)		(0.017)	
Africa	5.485***		1.391***	
	(0.023)		(0.025)	
Difference	-0.7165***		-0.058**	
	(0.028)		(0.030)	
Endowments *(Explained)*	0.702		-0.085	
	(0.622)		(0.498)	
Coefficients	0.271***		1.125***	
(Unexplained)	(0.053)		(0.048)	
Interaction	-1.689**		-1.098**	
	(0.623)		(0.499)	
FUNDAMENTALS	*Explained*	*Unexplained*	*Explained*	*Unexplained*
GDP growth	0.370***	-0.122***	0.023**	-0.125**
	(0.114)	(0.026)	(0.011)	(0.043)
Real per capita GDP	0.028	-0.166**	0.524	-0.328*
	(0.237)	(0.184)	(0.391)	(0.213)
Government debt/GDP	-0.001	0.347***	-0.213***	1.269***
	(0.002)	(0.082)	(0.047)	(0.101)
External debt/GDP	0.117**	-1.378***	0.279***	-1.996***
	(0.035)	(0.258)	(0.061)	(0.286)
Current account/GDP	-0.313***	-0.229***	0.082	0.028
	(0.030)	(0.027)	(0.056)	(0.041)
Reserves	0.211	-0.017	-0.611***	2.112***
	(0.494)	(0.043)	(0.066)	(0.388)
Fiscal balance/GDP	-0.251***	-0.201***	-0.279***	-0.218***
	(0.029)	(0.051)	(0.037)	(0.062)
LIBOR	0.077*	0.643***	0.315***	1.164***
	(0.052)	(0.111)	(0.075)	(0.140)
Exchange rate	0.522***	-0.085**	0.057*	-0.041*
	(0.161)	(0.036)	(0.038)	(0.027)
Investment/GDP	-0.053***	0.351***	-0.085***	0.929***
	(0.010)	(0.078)	(0.021)	(0.128)
Other	Yes	Yes	Yes	Yes
Observations	3,436		3,208	
Number of Countries	50		55	

Notes: *, ** and *** denote statistical significance at the 10%, 5% and 1% levels, respectively. The numbers in the parentheses () are standard errors

To sum up, our results indicate that mispricing of sovereign risk in Africa is due to the discriminatory component of financial markets regarding the credit worthiness of African sovereign debt and not due to the differences in the average quality of macroeconomic fundamentals between Africa and non-Africa regions. One possible explanation of this discriminatory behavior is global information processing, as investors in each African market tend to form their investment strategies based on those of the mega institutional investors. Thus, if investors in global markets form a consensus about investment decisions, spurious herding

formation follows.

6. Conclusion

The paper analyzes the contagion and herd behavior in Africa's debt markets and examines the determinants of Africa's sovereign risk pricing. The results confirm an asymmetric investor behavior in Africa's debt markets. This behavior implies an existence of herding or adverse herding effects and proves that African debt assets are treated as one category or class. Our most striking finding is that changes in market sentiment not obviously related to macroeconomic fundamentals has moved Africa's debt market by large amounts over the last decade. This indicates that the mispricing of sovereign risk in Africa is due to the discriminatory component of financial markets regarding the credit worthiness of African sovereign debt and not due to the differences in the average quality of macroeconomic fundamentals between Africa and non-Africa regions.

The obvious implication for policy is that African governments should be wiser when contemplating an economic policy strategy depending on international bond market. Large quantities of foreign credit may be available in these markets for Africa's development plans, but market sentiment can shift against the continent for reasons beyond their control. This may cause large current account and fiscal deficits. Our empirical analysis is useful, as well, for African borrowing countries. With this knowledge, borrowing countries can take positive steps towards managing their economies in a way such that the perceived default risk is kept at a level compatible with what lenders think is prudent. In addition, empirical information on the relationship between the level of the foreign debt and its cost is useful for the analysis of optimal borrowing strategies and of the social rate of discount in an open economy. Finally, the analysis about contagion would help multilateral policymakers to know when to sound the warning alarms when debt situations deteriorate to the point of having significant possibilities to transform into a major regional or even global crises.

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