NICOLA LIMODIO

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GENDER: M **CITIZENSHIP**: Italian

PRE-DOCTORAL STUDIES:

2011-2013	Master of Research in Economics, Merit, LSE
2005-2010	Certificate in Economics, Cum Laude, Scuola Superiore Sant'Anna
2008-2010	Master in Economics, Cum Laude, University of Pisa
2005-2008	Bachelor in Economics, Cum Laude, University of Pisa
2003-2005	International Baccalaureate, United World College of the Adriatic

DOCTORAL STUDIES: PhD Candidate in Economics, London School of Economics

DATES: 2013 - present

THESIS TITLE: "Essays in Development, Finance and Organisations"

EXPECTED COMPLETION DATE: August 2017

THESIS ADVISOR AND REFERENCES:

Professor Tim Besley (Advisor)
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Professor Ricardo Reis
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DESIRED TEACHING AND RESEARCH:

Primary Field: Development Economics

Secondary Fields: Finance, Monetary Economics, Organisational Economics

TEACHING EXPERIENCE:

2013-2016	Microeconomic Principles, II EC202, LSE
2013-2014	Advanced Econometrics, EC312, LSE
2013-2014	Introduction to Stata, Msc Economics, LSE
2013-2014	Introduction to Quantitative Methods, EC408, LSE
2012-2013	Introduction to Econometrics, EC220, LSE

RELEVANT POSITIONS HELD:

2015-2016	Research Assistant, Prof Ricardo Reis, LSE
2015-2016	Consultant, EBRD
2013-2016	Research Assistant, Prof Tim Besley, LSE
2013-2016	Consultant, World Bank
2012-2016	Graduate Teaching Assistant, LSE
2010-2011	Junior Professional Associate, World Bank
2009-2010	Visiting Researcher, UNU-MERT in Maastricht

LANGUAGES

Italian	Native
English	Proficient
French	Intermediate
Romanian	Beginner

HONORS, SCHOLARSHIPS AND FELLOWSHIPS:

2016	Unicredit & Universities 2016 Best Presentation, Petralia Applied Economics Workshop
2016	Research Grant, STICERD, LSE
2015	Junior Fellowship, Royal Economic Society
2014	Highly Commended for Innovative Teaching, LSE-SU Teaching Excellence Award
2014	Regulation and Development Grant, RSB-DEC, World Bank
2012	Departmental Scholarship, LSE
2011	Stefano Pieracci Prize, AISRE
2010	Marco Fanno Scholarship, Unicredit & Universities Foundation

COMPLETED PAPERS:

Job Market Paper:
"Deposit Volatility, Liquidity and Long-Term Investment: Evidence from a Natural Experiment in Pakistan" (with M. A. Choudhary, State Bank of Pakistan) – Available Here

Deposit volatility lowers loan maturities in the presence of costly bank liquidity, which in turn reduces long-term investment and output. We formalise this mechanism in a banking model and analyse exogenous variation in deposit volatility induced by a Sharia levy in Pakistan. Data from the universe of corporate loans and a firm-level survey show that deposit volatility and liquidity cost: 1) reduce loan maturities and lending rates; 2) leave loan amounts and total investment unchanged; 3) redirect investment from fixed assets towards working capital. A targeted liquidity program is quantified to generate yearly output gains between 0.042% and 0.205%.

Other Papers:

"The Development Impact of Financial Regulation: Evidence from Ethiopia"
(with F. Strobbe, World Bank) – World Bank Policy Research Working Paper 7734 (2016)

In absence of deposit insurance, underdeveloped financial systems can exhibit a coordination failure between banks, unable to commit on safe asset holding, and depositors, anticipating low deposit repayment in bad states. We show conditions under which a government can solve this failure by imposing safe asset purchases, which boosts deposits by increasing depositor repayment in bad states. In so doing, financial regulation stimulates bank profits if subsequent deposit growth exceeds the intermediation margin decline. As a result, it also promotes lending and branch installation. We present empirical evidence exploiting a unique policy change by the National Bank of Ethiopia in 2011. Analysing high-frequency bank balance sheets and long-term branch installation, we isolate the regulation effects, exploiting heterogeneity in bank size, and find increases in branches, deposits, loans, and safe assets, with no decline in overall profits.

"Manager Assignment and Project Returns: Evidence from the World Bank"
STICERD – EOPP Discussion Papers Series 61 (2016)

I study the impact of World Bank managers on project success through the value-added method. Manager effects are interpretable as performance indices and are more volatile than country effects. Both correlate positively with determinants of productivity (i.e., schooling and institutions respectively) and provide evidence of a negative assortative matching, with high-performing managers assigned to low-performing countries. Exploiting a novel variation for World Bank board access, I find a significant manager premium for countries in the board. All of these results are consistent with the World Bank behaving as a planner which assigns its managers as project inputs to client countries.

"Media, Demonstrations, and Public Good Delivery: Evidence from World Bank Projects during Natural Disasters" STICERD – EOPP Discussion Papers Series 62 (2016)

Media can affect governments and public policy by promoting anti-government demonstrations. Under media pressure, a multitasking government might reallocate effort across tasks, rather than increase the total aggregate, resulting in ambiguous welfare effects. In this paper, I test such a hypothesis using a database of World Bank project indicators, which measures government performance in implementing capital projects. Disasters offer an ideal case study because citizens and the government can differ particularly in their preferences between public capital (reconstruction) and consumption (relief). Therefore, at times of disasters, media might be especially effective in shaping public policy by promoting anti-government demonstrations. Joining capital project indicators with data on disasters, media, and demonstrations, I present the following: (1) within-state variation in floods and media activity for Indian states; (2) within-country variation in disasters and media freedom for 135 countries; (3) a case study using anecdotal and archival evidence on flood response in Ghana, Togo, and Ivory Coast in 2007/2008. In all cases, media activity during disasters is associated with lower capital project performance, higher relief/anti-poverty efforts, and more anti-government demonstrations.

"Financial Regulation and Government Revenue: The Effects of a Policy Change in Ethiopia"
(with F. Strobbe, World Bank) – World Bank Policy Research Working Paper 7733 (2016)

Financial regulation affects government revenue whenever it imposes both the mandatory quantity and price of government bonds. This paper studies a banking regulation adopted by the National Bank of Ethiopia in April 2011, which forces all private banks to purchase a fixed negative-yield government bond in proportion to private sector lending. Having access to monthly bank balance sheets, a survey of branch costs and public finances documentation, the effect of the policy on government revenue can be tracked. This is compared to three plausible revenue-generating alternatives: raising funds at competitive rates on international markets; distorting the private lending of the state-owned bank; and raising new deposits through additional branches of the state-owned bank. Three main results emerge: the government

revenue gain is moderate (1.5--2.6% of the tax revenue); banks comply with the policy and amass more safe assets; banks' profit growth slows without turning negative (from 10% to 2%).

RESEARCH IN PROGRESS:

"Institutions, Competition and Growth" (with T. Besley)

"The Intensive and Extensive Margins of Financial Access: Survey Evidence from the Universe of Ethiopian Branches" (with F. Strobbe)

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Research Proposal on Finance, Entrepreneurship and Development

There exists evidence, both theoretical and empirical, on the positive effects of finance on development. Credit creation, risk pooling and payment facilitation are three classic mechanisms. However, much less is known on the functioning of the main provider of finance in low-income countries (LICs): banks. Figure 1 highlights two interesting facts: 1) banks intermediate almost the entire share of financial assets at the lowest levels of income (both in a cross-country sense and in the USA between 1897 and 2002); 2) banks relevance decline as the development process unfolds.

Despite these facts, there is little evidence about how banks operate in low-income countries, which are the most relevant constraints they face and what is the optimal design of local financial institutions (i.e. central bank discount rates, financial regulation, deposit insurance, etc). This is especially relevant because financial policies can affect not only the stability of banks, but also the quantity of credit and its "quality" (i.e. maturity of loans, extent of collateralization, penalties...). Therefore, in my research agenda I plan to study and address this. In my current work I focus on the role of financial institutions in 1) promoting long-term finance and entrepreneurship and 2) stimulating financial access and savings mobilization.

Financial Institutions, Long-Term Finance and Entrepreneurship

My job market paper (co-authored with M. Ali Choudhary of the State Bank of Pakistan) shows that the interaction between deposit volatility and the cost of bank liquidity is key in reallocating loan and investment maturities from the long- toward the short-term. Although this result is based on Pakistan and exploits a unique source of exogenous variation, its insights naturally extend to other countries. For example, most African countries exhibit high deposit volatility combined with inadequate financial institutions: the majority of African central banks (54%) do not offer liquidity assistance to their commercial banks. Because African banks generally do not have access either to the international liquidity market (because of reputation) or to domestic interbank markets (generally nonexistent), then this lack of central-bank intervention implies a theoretically infinite cost of emergency lending. From the lenses of my model, this generates a collapse of long-term lending, and indeed, some of the least-developed countries present an average loan maturity of less than 4 months. Therefore the results of my work offer a

relatively easy-to-implement policy recommendation in stimulating long-term finance and investment: guarantee the banking system as a stable, reliable and accessible source of emergency liquidity by establishing Discount Window Facilities (DWF) and/or introduce liquidity auctions such as the Term Auction Facility in the United States. In order to assess empirically the effectiveness of liquidity facilities in promoting long-term finance and investment, I am currently exploring two additional projects.

First, I am establishing contacts with local officials at the Central Bank of Liberia (CBL) to study the introduction of a DWF, through which CBL plans to begin liquidity provision to commercial banks. Given that there has been local political interest for a few years in setting up a DWF, I am negotiating with local authorities the possibility of randomizing the order of phasing-in, the rates and the initial thresholds that banks are allowed. In agreement with the central bank and local commercial banks, this would permit to study the impacts of relaxing the liquidity constraints of banks on the terms of credit and investment.

At the same time, I am also setting up a project to study the returns of access to long-term finance in Ethiopia, in cooperation with Francesco Strobbe (World Bank), the Developement Bank of Ethiopia (DBE) and Ethiopian local commercial banks. I am establishing two studies to experimentally verify the effect of providing entrepreneurs with random access to long-term finance for corporate projects, exploiting an identification a la Karlan and Zinman (2009). The first experiment, with DBE, will consist of providing entrepreneurs with the randomized possibility of choosing between standard DBE loans (1-year maturity) and a new long-term loan (5-year maturity) across its 175 branches. The second experiment, in agreement with commercial banks, will randomize both the lending rate on long-term loans (3-year, 4-year and 5-year maturity) and the maximum amount that can be borrowed. Combining such financial data with yearly firm surveys and investment project-level data, I aim at measuring the effect of relaxing the supply of long-term finance on investment, technology adoption and entrepreneurship.

In the same project I also plan a second intervention, which would directly study the relation between the emergence of entrepreneurship and the availability of long-term finance. Specifically I plan to exploit a group of would-be entrepreneurs, which are in the record of DBE but have never been directly provided credit. I plan to randomize across group the announcement on the availability of long-term finance loans and verify whether, and to what extent, this changes the subsequent loan applications to DBE loans by would-be entrepreneurs and the type of financed projects.

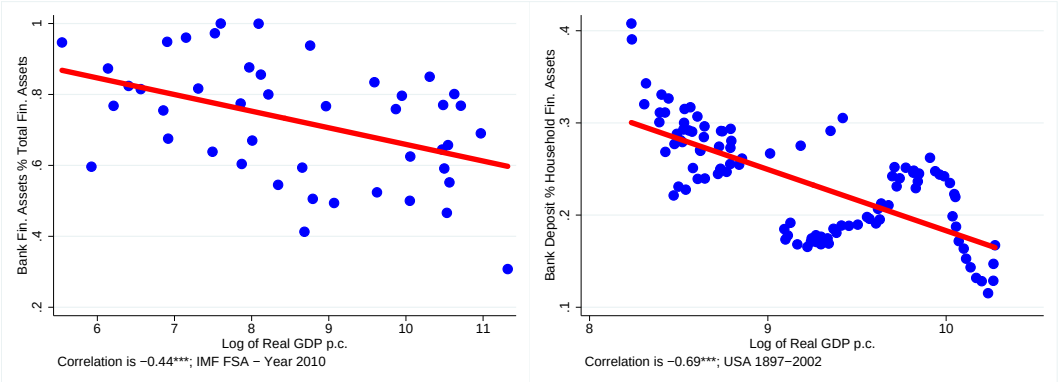
Financial Institutions, Access and Savings Mobilization

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Another key aspect through which finance benefits development is financial access. This generates first-order macroeconomic effects because extending the deposit base captures more resources for credit and investment. On the microeconomic effects, the results are less clear. On the one hand, there is evidence of benefiting "banked" individuals (i.e., substitute illegal moneylenders with market-oriented financing, provide a stable and reliable source of savings, etc.) as in Burgess and Pande (2005). On the other hand, Dupas et al. (2016) show that randomly providing free savings accounts to "unbanked" individuals may not deliver significant savings.

In my research agenda, I intend to refine this field by focusing on banks and exploring the economics of bank investment in financial access, especially their incentives and constraints. In particular, I will study what regulatory arrangements can promote financial access and through which channels this can take place. For example, in one of my papers, "The Development Impact of Financial Regulation: Evidence from Ethiopia and antebellum USA" (co-authored with Francesco Strobbe of the World Bank), I show that tightening safe asset regulation can promote trust in the solvency of banks in countries with high-default risk (such as Ethiopia), which increases deposits and creates government revenue by transferring profits away from banks. In another preliminary project, "The Intensive and Extensive Margins of Financial Access: Survey Evidence from the Universe of Ethiopian Branches" (co-authored with Francesco Strobbe), I highlight the various channels through which financial access can be provided by banks, specifically two channels: new branches (extensive margin) and better management (intensive margin), measured in line with Bloom and Van Reenen (2007). This has natural policy implications for the regulatory environment that central banks can create to stimulate financial access.

Figure 1: Bank Financial Asset Share and GDP per Capita



Notes: This figure shows scatter plots between the share of financial assets held in banks on the y-axes and the log of real GDP per capita (p.c.) on the x-axes. The left panel reports for 48 countries in 2010, and the right panel for the USA between 1987 and 2002. The correlation between these two variables is, respectively, -0.44 and -0.69, statistically different from zero at 1% in both. Data in the left panel are from the annual Financial Sector Assessment report conducted by the IMF in each country; data on log of the GDP per capita are in 2005 constant dollar from the Penn World Tables (Feenstra et al. (2015)). Data in the right panel are from the Historical Statistics of the United States. Between 1897 and

1945, statistics are from the table on "Personal Saving, by Major Components of Assets and Liabilities", contributed by John A. James and Richard Sylla in Carter et al (Historical statistics of the United States: millennial edition). Data on GDP per capita over the whole period in 1897–2002 USA are expressed in 1990 Int. GK$ from the Maddison Project (Bolt and Zanden (2014)).

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Burgess, R. and Pande, R.: 2005, Do Rural Banks Matter? Evidence from the Indian Social Banking Experiment, *The American Economic Review* **95**(3), 780–795.

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Karlan, D. and Zinman, J.: 2009, Observing unobservables: Identifying information asymmetries with a consumer credit field experiment, *Econometrica* **77**(6), 1993–2008.

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Department of Economics
Timothy Besley
School Professor of Economics and Political Science

October 25th 2016

To Whom It May Concern

Nicola Limodio

I am writing in support of Nicola Limodio, a PhD student who I advise in the economics department at LSE, who is on the junior job market this year. Nicola has broad interests related to the field of development, especially the study of banking and finance. He is an excellent prospect who should be of interest to a wide range of top economics departments, business and policy schools.

Nicola's job market paper is on a specific aspect of banking in Pakistan. The paper is based on a natural experiment due to an institution called Zakat, whereby the government puts a tax on bank deposits each Ramadan - which depends on the price of silver on a specific day of the year and which branch of Islam the account holder belongs to. Even though the exact timing of Ramadan moves round, it is known in advance to depositors, the indexation of the tax to the silver price creates some uncertainty about its size. This creates a "shock" to bank deposits which is heterogeneous over time and across bank branches depending on the relative fractions of Sunni and Shia Muslims who are customers. If the shock is large enough, it will require the bank to seek liquidity at the central bank which is available at a punitive rate. The basic idea of the paper is that this uncertain shock to deposits will create a reluctance by banks to make long-term loans, given that exposure to such loans puts the bank at greater risk of experiencing liquidity problems relative to only making short-term loans. Thus, Nicola investigates whether there is an impact on the lending portfolio of affected banks. To do so, he has collected data on the loan portfolios of banks and shows that the volatility of silver prices, interacted with exposure to the shock, reduces the amount of long-term lending that a bank undertakes. For a sample of large firms, there also seems to be a negative effect on investment in fixed capital. Thus, the Zakat institution affects not only the kind of funding available to firms but also their resource allocation decisions. This suggests that there can be a development impact to the extent that there is less long-term lending in the economy.

Although the institution that he studies is specific, this analysis is of wider interest beyond the Pakistani context, since he shows in cross-country data that there are two broad facts across a range of developing countries compared to rich countries: (i) greater deposit volatility and (ii) less long-term lending. The paper is also interesting since it develops a theoretical model to motivate the empirical specification along with the careful empirical analysis from this unique source of data. Nicola could only obtain access to the detailed data on bank loans, to make the project viable, by working together with the chief economist of the state bank of Pakistan who is a co-author on the paper. He also had to travel to Lahore to spend time there extracting and cleaning the data. I am sure that their collaboration has been productive but I am also confident that this is essentially Nicola's own work, both in the conception of the project, the development of the theory and the empirical design.

Overall, this is a highly professional piece of applied research which should be of interest to a wide range of economists, not just those interested in development, but also those with interests in banking, finance and macro. Having a macro shock (but with heterogeneous effects) is a facet of the work which makes the paper clean and interesting. He is also working with Ricardo Reis and Daniel Paravisini and given his range of interests, they will be able to offer perspective in their letters on how this fits into wider literatures that they work in.

The paper is also rare as there are few papers using detailed micro data on the behaviour of banks in developing countries. There is plenty of interest in the question of how access to finance matters for development and growth. However, Nicola's paper is quite specific in testing a mechanism and assessing its importance quantitatively. The paper fits into Nicola's wider interest in banking and development. He had an earlier paper on banking in Ethiopia in which he looks at how regulations on holding capital affected bank branch expansion and lending, again using a unique sources of data which again he worked hard to get access to. He finds, somewhat counterintuitively, that regulations on holding more deposits actually increased lending once the extensive margin of opening bank branches is studied. As in his paper on Pakistan, he develops a theoretical model to interpret the data and this has a genuine influence on his empirical approach.

In other work, Nicola has worked on the allocation of projects and their success at the World Bank. It required a good deal of work to link the lending projects financed by the World Bank to the managers responsible for originating and developing the projects. Following ideas literature on teacher quality and the competence of CEOs, he estimates a set of manager "fixed effects'' to represent the importance of manager competence in projects. He finds these to be highly significant in explaining project ratings, i.e. the final scores assigned to the project by the Bank's internal evaluation department. He looks at the matching of managers to projects in addition to sources of heterogeneity that have been looked at previously such as country-level institutions. He also uses turnover in the board at the World Bank as a source of exogenous variation which affects projects selection by country. This is an interesting paper, given the continued importance of the World Bank as a lender and a source of technical assistance.

Nicola is a relatively unusual product as a development economist. He has very wide interests which are unified by an interest on development lending and financing, either by the World Bank or private banks, as in his studies of Ethiopia or Pakistan. The latter is particularly apposite given the post-financial crisis interest in the role of banks around the world, and the importance of bank finance (relative to equity finance) in developing countries. He has already accumulated a great deal of expertise in this area and he knows the relevant literature and ideas very well. Indeed, this is a feature of Nicola as an economist; that he sees how ideas fit together and how this supports general concerns about the factors driving long-run development. Given his interests, he would be particularly well-suited to a position in a business school where there is an interest in having someone who knows a lot about emerging market economies. But he would also fit well into a development slot in an economics department or policy school. His background experience included a stint working at the World Bank, and also supporting a review that I did of the development economics group at the World Bank, and of the mission of the EBRD. He showed maturity and good judgement in this work. He also has a lot of interest in discussing development issues in the broadest sense, as well as the state of research in the field. He is excellent in seminars and makes himself available to talk to other students about their work. He has a maturity and confidence to his manner well beyond his years.

There have been a number of successful students on the market in recent years interested in finance and development. However, Nicola is rather different to most of them, combining the study of institutional features, policy, theory, and empirics in his work. He is rooted in a much older literature on financial repression and development, but brings modern methods to its study. He has produced a decent number of papers as a PhD student and I expect him to be highly productive in future, particularly given his demonstrated ability at tracking down data sources. Anyone with experience trying to do this knows that this requires tenacity and skill. Quality-wise Nicola is certainly towards the top of the quality distribution of LSE PhDs in recent years. For example, he is comparable to students who have most recently placed at Kellogg, UBC and top European schools. I expect him to do at least as well as his advisor, Daniel Paravisini, whose first job was at Columbia Business School and who occupies a very similar intellectual niche. I should also note that he is one of the most motivated and hard-working students I have ever encountered. I have no doubt that he will be an excellent and engaging colleague wherever he ends up.

If I can clarify anything that I have said, please do not hesitate to contact me.

Yours faithfully,



Timothy Besley
School Professor of Economics and Political Science &
W. Arthur Lewis Professor of Development Economics

STICERD
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Oriana Bandiera
Professor, Department of Economics
Director, STICERD

London, November 4, 2016

Dear colleague,

I am writing in support of Nicola LIMODIO's application for a tenure track position in your department.

I have known Nicola since he started the PhD program at the LSE and I have been advising him regularly over the years. Nicola's broad area of research is development economics, which he bridges with finance and monetary policy.

His job market paper "Deposit Volatility, Liquidity and Long-Term Investment: Evidence from a Natural Experiment in Pakistan" cleverly exploits variation in deposit volatility created by a religious norm to quantify the effect of volatility on loan maturity and firm investment horizons. Nicola's motivation stems from the cross-country correlation between development and loan maturities: banks in poorer countries tend to give shorter loans. This constrains firms' investment horizons and potentially stifles growth.

To break this vicious circle, one needs to understand the mechanism that links underdevelopment and loan maturity. Nicola's paper presents convincing evidence on one such mechanism that arises due to a combination of deposit volatility and limited liquidity. The intuition is as follows. Banks take deposits and give out loans. When liquidity is cheap, bank can borrow to smooth short run fluctuations in deposits and hence deposit volatility does not affect lending decisions. When banks are unable to smooth, deposit volatility results in shorter loan maturities.

Identifying the causal link from volatility to loan maturity and then to investment requires a source of variation in volatility that does not affect loan maturity. Nicola finds such a source in Pakistan where the government manages a religious obligation to give charity to the poor (Zakat) via a 2.5% tax on bank deposits.

This is ideal for the purpose of Nicola's paper for two reasons. First, the tax is applicable only to deposits that exceed a given threshold whose value depends on the price of

silver. Fluctuations in the price of silver around the time when Zakat is due create uncertainty and deposit volatility, which, in turn, affect loan maturity when the cost of liquidity is high. Second, the tax is only levied on Sharia Muslims, and this creates variation in the banks exposure to deposit volatility within a given year. This cross-bank within year variation can be used to identify the effect of deposit volatility while controlling for the state of the economy.

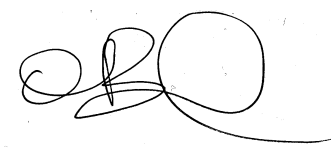
To implement this identification strategy Nicola collaborated with Mr Choudhary at the State Bank of Pakistan to put together an impressive data set containing the universe of corporate loans between 2002 and 2010 and a survey of firms. The findings are striking: when silver prices are volatile and the cost of liquidity is high, banks that are more exposed to deposit volatility reduce the maturity of the loans they issue to firms, and firms react by shifting from long to short run investment projects. As the effect of deposit volatility only materializes when the cost of liquidity is high, a policy that lowers liquidity costs can neutralize the effect of volatility on loan maturity and investment. Nicola develops and calibrates a simple theoretical model that show that such policy could increase output by at least .04%

This is a clever paper that uses a micro identification strategy to shed light on an important macro mechanism. I think it will definitely hit a top field journal and it has a good chance at a top journal.

The ability to bridge between micro and macro and to borrow from different fields is as valuable as is rare in our profession. I think building bridges is Nicola's most distinctive skill. As you can see from the composition of his committee, he is someone who can simultaneously engage with development, public, labor, monetary and finance and keep all interested in his work. Building bridges is risky because there's a risk of falling in between but the risk comes with the significant reward of work that transcends the narrow borders of a given field.

On a personal level, Nicola is a energetic, entrepreneurial and extremely hard working. He is also very confident and an excellent communicator. Finally he has a talent for bringing people together and manage teams successfully. He would be a great hire for departments that value the ability to bridge between groups, all public policy schools and especially all business schools with a global outlook, especially the very top.

With very best wishes,



Professor Oriana Bandiera

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Ricardo Reis
A.W. Phillips Chair
Professor of Economics

17th of November 2016
Letter of reference for Nicola Limodio

Dear Sir/Ms.,

I am writing on behalf of Nicola Limodio, a student doing research in development economics with applications in finance and monetary economics that is on the academic job market and is expected to complete his PhD at the LSE by the end of the 2016-17 academic year. I have been a secondary advisor on Nicola's job market paper over the past year, as it deals with issues related to central banking. In that role I have ended up spending quite a bit of time talking to Nicola, and hired him as research assistant on a project this past summer, so I have gotten to know him quite well.

Nicola is an unusual candidate because his research falls between fields. This arises because he works on a subfield that, in my view, is very important but has almost no one working on it: central banking issues in developing countries. Broadening his interests to the more general study of financial markets in development, then he brings to mind comparisons to Daniel Paravisini or Asim Khwaja, for instance, although Daniel was closer to the corporate finance and banking research communities and Asim focused on classic finance and development questions. Nicola instead is asking original questions in monetary economics in a development context. I hope you will appreciate this uniqueness. In hiring Nicola, you will get a top-trained empirical development economist in terms of skills, but with research interests that are those of a macro financial economist. Moreover, he is a very collegial and entrepreneurial person, so he will easily interact with different researchers and draw bridges among groups.

Nicola's job market paper studies the importance of liquidity in interbank markets. It is well understood that because demand deposits are liquid while loans are not, banks often need to use interbank overnight markets or the discount window of the central bank. In advanced countries, the former dominates, and the discount window is rarely used outside of financial crisis. Moreover, in advanced economies it is often hard to identify large shocks to bank deposits that are driven by fundamentals, and almost impossible to find exogenous variation in the volatility (as opposed to realizations) of deposits. In developing countries, instead, the discount window is often the only source of liquidity, and there are large fluctuations in deposits, for instance due to weather shocks in agriculture. Studying developing countries gives us a much better chance to understand the usefulness of interbank markets and the impact that volatility in deposits has on the credit decision of banks.

Nicola looks at a particular feature of the banking sector in Pakistan. A religious law imposes a yearly tax on bank deposits above a threshold, where the size of the threshold depends on the price of silver 2-3 days before the date of collection, and the levy is applied only on the balance held on one precise day. Therefore, the tax encourages large deposits withdrawals just before that day and reinvestments the day after, so it becomes a shock to deposit volatility. Moreover, because the size of the tax varies with the price of silver, which is exogenous to the Pakistani economy, variance in the price of silver will lead to exogenous variation in the volatility of deposits. Nicola therefore has a plausible identification strategy to see the effect of deposit volatility on credit decisions by banks, from their size to the composition, and to the investment decisions by firms connected to those banks.

Nicola finds that banks facing higher deposit volatility do not significantly cut the amount of credit given, but choose a smaller maturity for loans. Firms respond by reorienting investment from fixed capital to working capital. It is a fact that the average maturity of loans is positively related to the level of income per capita across countries, and some have speculated that this may lead to too little investment in poor countries. Nicola's results suggest that deposit volatility is a leading cause behind this fact. Moreover, his results support the introduction of interbank markets or of the better use of central bank policy through targeted liquidity programs to generate large gains for the country's financial development. This is exciting work that is important to understand the role of central banks and the mechanisms through which financial development affects growth.

I know well another paper by Nicola, where he uses Ethiopian data to study the impact of a particular and very common form of financial repression: facing banks to hold government liabilities (e.g., "required reserves") that pay a below market interest rate. Nicola finds that private lending actually rose after this policy. He argues that this is because forcing banks to hold safe assets provides a signal that improves on an inefficiency in coordinating the health of banks by depositors. While I am not sure this is the ultimate explanation for the facts, again in this paper Nicola shows how to use rigorous empirical work to address a question of financial regulation that has often been discussed only in theoretical terms.

Nicola is an excellent presenter and communicator of his work, and a terrific and committed teacher. I can see him thriving in a business school or in a policy school where his ability to provide an intersection between financial and central banking issues applied to developing countries may be especially appreciated. Economics department that value strong interactions among different groups should also strongly appreciate Nicola's unique combination of applied micro skills and macro-finance questions. Finally, research departments of central banks should find him extremely valuable, although noting that he is committed to research as opposed to policy jobs. I recommend him strongly, and given his unusual skills and interests, I encourage a wide variety of future employers to have a close look at his application.

I hope that you find these comments useful. Please do not hesitate to contact me if I can be of any further assistance.

Yours sincerely,



THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

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Dear Recruiting Committee,

With great pleasure I write this letter to recommend Nicola Limodio for a junior faculty position in your group. Nicola is an economist working on financial development topics and thus his work is of natural interest to Economics Departments, but also to Finance Departments with board interests in studying financial economics in the context of Emerging Markets. Nicola is extremely smart, creative, entrepreneurial, and hard working. I strongly recommend any school looking for an outstanding researcher in financial economics to take a look at his file.

Nicola has broad interests but I am better qualified to talk about his empirical work in banking, and in particular his job market paper that studies the effect of bank deposit volatility on the supply of credit. The insights of Nicola's research come not only from providing evidence of whether deposit volatility affects credit supply, but also from when it affects it and how.
Regarding the question of when, he argues quite naturally that deposit volatility matters for the supply of credit only when the bank's cost of accessing external liquidity to substitute funding shortages is high. What is less obvious is the question of how: Nicola argues (and shows in a simple model) that deposit volatility affects the supply of **maturity**. In fact, Nicola shows in a very simple model that deposit volatility has an unambiguous (weakly) negative effect on maturity, while its effect on the amount and price of credit are ambiguous. The reason for the latter ambiguity is that long and short term credit are not perfect substitutes and have different prices, and a long term maturity shortage may force firms to substitute towards larger amounts of cheaper short term financing. Since maturity transformation is one of the fundamental roles of financial intermediaries, his paper highlights a novel and potentially important channel through which banking market frictions may affect investment and growth.

The empirical setting that Nicola uses to try to demonstrate the existence of this volatility-maturity nexus is extremely interesting. He uses as a source of time-series variation in the volatility of deposits, a time- and amount-varying tax on deposits in Pakistan. The tax (Zakat) is imposed by a mandatory contribution that Muslims are expected to provide to the poor, and is levied on the balance of deposits on the first day of every Ramadan that is in excess of the value of 612.32 grams of silver (at current market prices). Since the tax, which is 2.5% of the balance above the threshold, can be avoided by lowering the amount of deposits by the Zakat date, it

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induces time series variation in the level and the volatility of deposits that is correlated with the level and volatility of the price of silver. Nicola uses the volatility of the price of silver before Zakat as a source of time series variation for deposit volatility. To motivate this approach shows a very interesting stylized fact: the volatility of the price of silver prior to Zakat is correlated with the volatility of deposits in Zakat, but it is not correlated with the level or deposits prior to Zakat. This is important because in most empirical studies it is difficult to tell apart the impact of the level of a variable X on a variable Y from the impact of the variance of X on Y. In the Zakat setting disentangling these two effects is plausible, and fully justifies the analysis despite its limitations on the external validity of the results.

As a source of cross sectional variation in the deposits volatility induced by Zakat, Nicola exploits the fact that not all banks are equally affected by the tax. First, banks with a large fraction of small deposits, less likely to be taxed, will see their deposits fluctuate less in anticipation of the tax than banks with a larger deposit concentration (he calls this the intensive margin of Zakat variation). And second, banks with a larger fraction of Sunni depositors (who are the only ones that are taxed) will see their deposits fluctuate more than banks with a small fraction of Sunni depositors (he calls this the extensive margin).

The last ingredient in the empirical design is the use of within-firm estimators, as in Khwaja and Mian (2005). By using data from the Bank of Pakistan that allows tracking the amount, maturity and price of credit a firm takes from different banks, Nicola can estimate regressions that saturate all firm-time variation (e.g. that include firm-time dummies). This implies that the estimates are identified of changes in the maturity (or amount, or price) of credit that a firm holds from a bank that is more exposed to Zakat, relative to the maturity that the same firm holds with a bank that is less exposed to Zakat, before and after Zakat dates that are preceded by periods with highly volatile price of silver.

Nicola finds that when the cost of external liquidity is high, measured as the cost of borrowing from the Bank of Pakistan, high deposit volatility shortens average loan maturity, lowers the average cost of borrowing, and has no effect on the amount of borrowing. As discussed above, the decline in the average cost of borrowing is an expected consequence of firms substituting high price long term debt for low price short term debt. Consistent with the predictions of the model, the price of long term debt increases with the volatility of deposits (when external liquidity is expensive). The results are robust to a myriad of alternative tests, too many to summarize here but that are worth taking a look for the skeptical reader (I particularly like a placebo test that rules out that the volatility of the price of silver affects lending maturity but not through the deposit volatility mechanism).

To complement the analysis Nicola shows some suggestive evidence on how firm investment changes in response to the changes the supply of maturity. The evidence is suggestive because when looking at investment and other firm-level outcomes he can no longer saturate the firm-level shocks. Nevertheless, the results in this section are interesting: firms seem to change the maturity of their investments in response to the change in the maturity of finding. That is, even though the level of investment remains relatively unchanged, firms invest less in fixed assets and more in working capital as a response to the decline in the supply of maturity. Taken at face value, these results highlight the relevance of the maturity transformation role of banks for the real economy. Nicola wraps up the analysis by taking the model seriously to calibrate the size of the aggregate cost of deposit volatility.

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I strongly recommend that you meet with Nicola in Chicago. You will have the opportunity to confirm that he is a well rounded economist who can communicate clearly his research. I have no doubt that he will be a great colleague and an excellent teacher. I will be happy to discuss his case further, so please do not hesitate in contacting me if you have any additional questions.

Sincerely,



Daniel Paravisini
London School of Economics

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