

Research statement of Rachid Laajaj,  
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## Research statement

I am a development economist, whose research is primarily focused on technology adoption in agriculture, human capital (HK) and corruption. The tools I've used include RCT that I have implemented in the field, quasi-experimental analysis using administrative data and theoretical models. As you will see, some of my research took me to work together with co-authors in different fields, from agronomy to psychology. This may appear to go in many directions, but it is the result of my continuous thinking about what development truly is and what are the entry points that can make my research most effective at improving the quality of life of the poor.

I would like to share my conception of development, quite simple, but I think it provides a framework that binds together my past, current and intended future research.

What is development? I would broadly define it as the process under which individuals in a society achieve a higher level of well-being. Let's represent the world as a set of transformation functions. Among them, production functions that transform inputs into other inputs or consumption goods and services, and utility functions which transform this consumption into well-being. These transformation functions can include the improvement of infrastructures and institutions, which then contribute to the consumption of goods and services that can affect well-being.

In this context, the first element of development is the shift towards more productive production functions. This results from a higher level of HK allowing gains in productivity through technological development and better management from high skills individuals, but also through better micro-decisions from each worker at his or her level of responsibility.

Hence more HK expands the set of achievable utilities because it allows more efficient transformation functions and improves decisions. This is represented in figure 1a, which displays an economy with 2 agents and the level of utility that can be achieved under two levels of HK. The edge of the achievable set represents the pareto optimal levels of well-being.

This takes us to the second fundamental element of development: cooperation. All agents would agree that it is better to be on one of the pareto optimal allocations, but they have different preferences for which optimal allocation. This can generate tensions which may result in private actions that takes the agents away from the pareto optimum allocations. I illustrate this in figure 1b. Suppose that agent 1 has the possibility to shift from A to B, through what I will call loophole 1. Then agent 2 also has the possibility to move from B to C through loophole 2. A loophole can be due to rent-seeking rather than productive activity, but more generally includes any action where the private interest goes against the public interest, hence it includes for example the consumption of a good or service with high externality. In this case it is individually rational for each agent to make use of the loophole, but as a result, both agents are worse off than if they did not use it.

The existence of loopholes (and decision to use it or cooperate) are themselves a function of HK. This is what makes development not guaranteed as a consequence of the expansion of HK. In fact, technology tends to expand the set of achievable well-being outcomes in all direction. Hence, in cases of low

cooperation the agents can even reach a level of utility that is so low that it was not achievable without HK (as represented in figure 1c if HK increases, but the equilibrium goes from A to B). Technology opens the possibility of much nicer living conditions, but also gave birth to the nuclear that can destroy the planet in one day. If cooperation in the face of global warming remains as low in the coming decade, it is likely to take us to levels of development below what has ever been experienced before.

Figure 1a

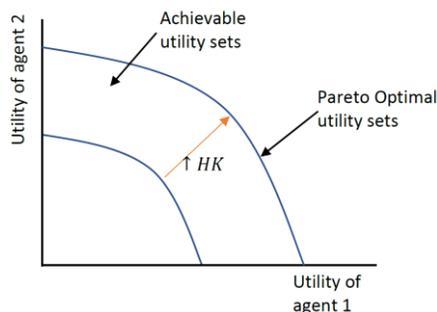


Figure 1b

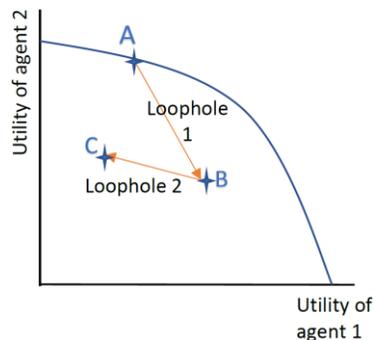
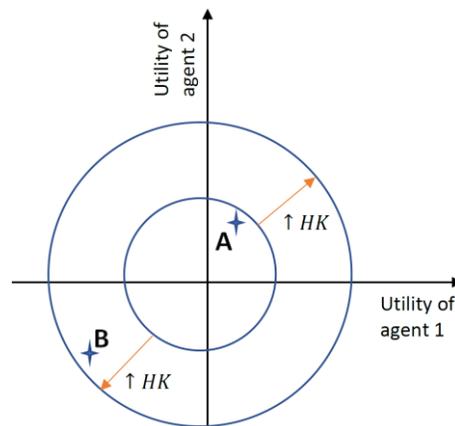


Figure 1c



In this admittedly very sketchy representation of an economy, HK and cooperation are the two fundamental drivers of development. Technology adoption in agriculture represents one of the key challenges where human capital is necessary both at the top level (to generate adapted technologies as well as the institutions and programs that can trigger the diffusion) and among each smallholder decision maker. HK and its distribution are central to all stages of economic development. And corruption is one of the most obvious forms of non-cooperation, using one’s power to sacrifice the common good for his or her personal interest. Many interventions that tackle corruption can use combinations of incentives and use of technologies and information to close the loopholes or make them less attractive. My research aims at using most up to date tools in the economic literature to better understand and address these challenges.

Tables 1 and 2 provide a list of my publications and ongoing research with the journals of submission or intended publication. Figure 1 provides the Google Scholar counting of the citations, and Appendix 1 provides the abstracts of my recently published and ongoing papers. The following sections provides an overview of my ongoing research by topic (and combinations of these topics).

*Technology adoption in agriculture*

Technology adoption in agriculture focuses on perhaps one of the area that can have the most impact on poverty reduction, because most of the poor live in rural areas, and addressing why farmers may not make use of promising technologies can yield to large improvements in the economic conditions of those who need it the most.

My work with Michael Carter and Dean Yang in Mozambique experimentally tests the impacts of some widespread types of interventions to support farmers, such as input subsidies and the promotion of savings accounts (through trainings and matched savings). A first paper focuses on the [voucher program](#), paying particular attention to farmers’ learning about the returns of the technology, to how adoption

survives the end of the subsidy and to its diffusion across social networks. We show that, despite rarely being taken into account in the policy debate, the long term effects and spillovers accounts for most of the benefits of the input subsidy program.

In a [second paper, we compare the effect of the two programs](#) and highlight how the effect of a directed intervention (the voucher), can be conditional on alternative economic opportunities (enabled by the savings intervention). We find that both interventions have a high positive impact on beneficiaries, but that their effects do not add up when provided together. In a context with high heterogeneity, savings may allow farmers to focus on the investment that most enhances their utility, at the expense of fertilizer use.

Given the strong impacts of the savings intervention, in a third paper, we try to understand [why private providers of such technologies rarely carry out such trainings](#). Our theoretical model explains it by the fact that they can only capture a small share of the surplus that technology adoption generates, with the majority of the increase in savings occurring in other banks. Furthermore, this share decreases with the presence of close by competition, which benefits from the increased demand generated by a firm's training. The paper provides a theoretical model and empirical evidence of this new explanation to the lack of technology diffusion in many contexts. In this context, coordination among suppliers may address the under-provision of training for the new technology.

Building on data collected during this project, my job market paper ([JDE 2017](#)) provides theoretical and empirical evidence that negative economic prospects tend to push farmers to reduce their planning horizon, generating a vicious cycle between poverty and shortsightedness. And part of the large positive effects of the savings and voucher programs can be explained by a multiplier that comes from breaking this vicious cycle.

### *Technology Adoption and Human Capital*

My work with Karen Macours in Kenya explores the crucial role of HK in the context of technology adoption. We implemented an RCT where we randomized assignment of participation to agronomic trials managed by the farmers in their own plots. We combined it with intense skills measurement and 6 rounds of survey to observe how farmer learn when exposed to new technologies and practices. We find a learning that is progressive, slow and highly conditional on the skills of the farmers. We also observe strong spillovers, themselves conditional on skills.

HK is complex though, and measures that can properly capture its multidimensional aspects in a developing context is a pre-condition for making progress in the understanding of its role. Hence, using the same sample and an additional sample in Sucre, Colombia, we apply a battery of psychometric tests to assess the [reliability and validity of measures of cognitive skills, non-cognitive skills and technical knowledge](#) (R&R at *Journal of Human Resources*). The results generally confirm the validity of cognitive measures, shows a lot of noise in measures of technical knowledge, and multiple concerns of low validity in non-cognitive measures.

Puzzled by these results, in a separate papers with Karen and other co-authors, including psychometricians, we gathered 29 datasets of the [Big Five personality traits from 23 low and middle-income countries](#), (forthcoming in *Science Advances*) and raise similar issues as the ones found with non-cognitive data in Kenya and Colombia. With these survey data, the expected five factor model rarely emerges. By contrast, data collected through online surveys in the same countries show much higher validity. Our analysis provides a cautionary tale for development economists using such data, and some elements of explanations of the causes of the problem.

The field work in Kenya was also an occasion to learn a lot from regular interaction with a team of agronomists from the International Institute for Tropical Agriculture (IITA). This cooperation made us realize the numerous differences between agronomic and economic analysis which can have important implications for understanding the technology adoption dilemmas. For [this paper](#) (R&R at *PNAS*) we collected agronomic and survey data from 480 households who participated to agronomic research trials. We first estimate yield and yields increments attributed to different input packages, as typically estimated in agronomic trials. We then adjust the calculation of yield increment from different input packages for the calculation methods, farmer selection, plot selection, and the difference between the quality of management in trials compared to the one in an average plot of an average smallholder. We find that the adjustments can substantially change yield and yield increments and thus the implications about whether the inputs packages should be promoted or not. We raise the importance of a better communication between agronomists and economists in order to make progress at finding out what technologies are actually the most promising ones in the farmers' context.

### *Human Capital*

My [work with Andres Moya and Fabio Sanchez](#) also explores the formation of HK. *Ser Pilo Paga* is a nationwide merit and needs based university scholarship in Colombia that changed opportunities of access to high quality university for poor students. We show that, the scholarship motivated eligible students to work harder and obtain better scores at the pre-university national exam. It is the first work to demonstrate the motivational effect of a scholarship at such a scale in a developing country, it provides lessons on the extent to which the lack of social mobility can discourage students from investing effort in their education. It also shows that combining merit and need based criteria can offer a practical solution to address the lack of social mobility.

My interest in behavioral economics lies in better understanding the role of the multidimensional set of abilities that HK is, and how to generate durable change in these abilities. The research on the motivational effects of *Ser Pilo Paga*, the nationwide scholarship, as well as the endogenous time horizon paper in Mozambique, share a point of view that the lack of opportunity can generate behavioral reactions that may contribute to a vicious cycle. As described in my discussion in an [discussion in an NBER publication](#) on the economics of poverty trap, it is essential to take full consideration that the discouragement can be a rational reaction to limit the psychological consequences of real obstacles. According to most models of behavioral poverty trap, trying to directly change aspirations can have mixed effects on the well-being of the beneficiaries. Even though a "behavioral poverty trap" may be part of the problem, my research emphasizes a different approach than those that try to directly lift aspirations. It tends to show that interventions that remove obstacles can have a multiplying effect through behavioral changes.

### *Human Capital and Corruption*

As raised in the introduction, corruption is one of the clearest manifestations of a lack of cooperation that prevents development. One of its most harmful consequences is to divert the capacity of "talents" from productive to rent thinking activities. Yet there is relatively little evidence of this. With Christian Ebeke and Luc Desire Omgba ([JDE 2015](#)), we show that, across developing countries, if the country has good institutions, then an increase in oil resources is associated with university students being more likely to elect engineering careers, which we interpret as a technological effect. By contrast, if institutions are

poor, then more oil resources is associated with attractiveness of careers with a greater access to the rent, such as lawyer, management and economists.

In an ongoing work with Cristhian Acosta, we document a similar effect within Colombia using municipal level data. Our empirical strategy makes use of the 2012 reform, which redistributed royalties, making it much less concentrated on producing municipalities. We also use the proportion of Sedimentary basins to obtain a more exogenous prediction of the production of hydrocarbons. Hence this micro work allows us to better isolate the effect of royalties on students' career choice. In line with the findings of the macro paper previously described, we find that an increase in royalties makes management careers (business, accounting, law and economics) more attractive than engineering careers, and that this effect is concentrated in municipalities with more corruption allegations in the years before the reform. As explained in our theoretical model, this research provides new micro-evidence that students' career choices can be driven by expected official as well as non-official revenues, in which case, royalties and poor institutions result in an excess of talents in activities with better access to the rent, resulting in a lower marginal productivity of these careers.

### *Corruption*

With Marcela Eslava and Tidiane Kinda, we study [the effect on the manufacturing sector of the sequential computerization of import transactions in Colombian Customs](#) between 2000 and 2005. The reform aimed at reducing bureaucracy and corruption that are due to the direct interaction between customs agents and importing firms. Using a triple difference based on customs, time and exposure to the reform (considering firms importing prior to the reform as more exposed), we show that the reform facilitated trade, reduced corruption and significantly heightened the economic activity of manufacturing firms in the country.

One interesting lesson of the latter is that a proper use of information technology implies increasing some information flows (e.g. to increase accountability), but also intentionally cutting some information links (when the risk of coercion or collusion is high). As technologies have developed, we increased the range of possibilities to foment communication or prevent it (separately for each link between different agents), but the theoretical tools that provide clear guidance on how to optimally manipulate information flows are still limited. The first best may be perfect information, but when it is costly to depart from the initial information structure, full information may be too expensive. For example, in some cases the principal would even want to pay to reduce some information flows (at the cost of reducing productivity) in order to close loopholes that would allow agents to collude at the expense of the general interest. The paper intends to make these tradeoffs more explicit, to help guide decision making on the manipulation of information flows. This joint theoretical work with Federico Gonzalez is in progress, but still at an early stage (no abstract available yet).

### *Future research*

As it can be seen from above, I have a lot of ongoing work, of which a majority is close to being sent out for publication. Hence my first priority for the near future is to get most of this research out.

I am currently discussing with the Inter-American Development Bank the funding of an impact evaluation of the "Fondo Colombia Sostenible", which is one of the largest funds for post-conflict reconstruction in Colombia. It will fund a large number of selected small scale projects in post-conflict municipalities to promote sustainable development and poverty reduction. The study will evaluate the impacts of

supporting local initiatives in such context of high deprivation and isolation during a long period of time. Using geospatial data, it also aims to investigate whether the economic benefits from the intervention helps driving the populations away from illegal activities such as crime and coca plantations.

In the area of technology adoption and HK, I would like to do more to combine the analysis of skills and network, to develop a better understanding in how the distribution of skills in a population can affect technology adoption patterns. For example, within a village, general technology uptake may require a combination of high skills early adopters and sufficient middle skills followers, generating complementarities between the two groups.

I am also interested in doing more to relate technology adoption to institutional capacity. A lot of prior studies (including some of mine) try to address the question of what type of intervention works best (e.g. subsidy, training, technical assistance, etc.), whereas my impression from the field is that the evil is in the details. A voucher program can have a large impact if well implemented or a much modest one if poorly implemented. Hence the institutional capacity (which I would relate to the skills and good intentions of the local leaders or institutions) are key to identify the conditions that lead to a proper implementation.

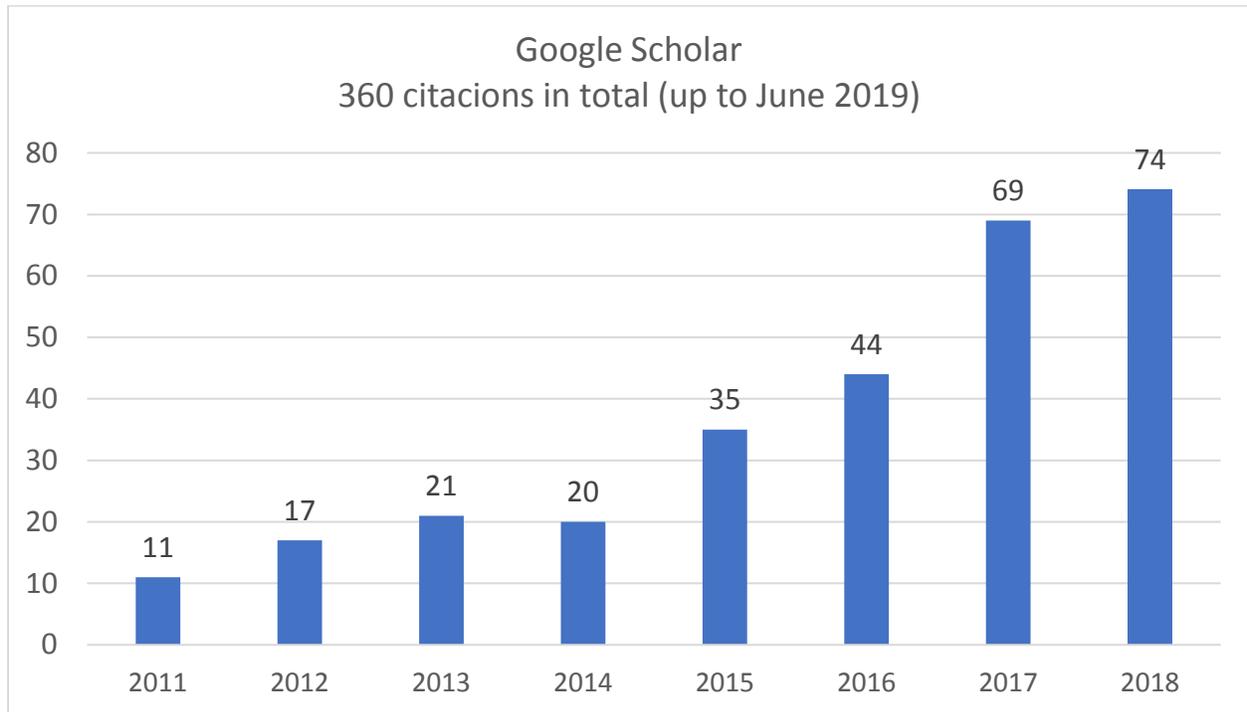
I also aim to conduct research on how corruption reduces meritocracy, putting less competent individuals in power and study its consequences for the economy and for social mobility. I believe that it is one of the areas where corruption is most harmful, and yet for which our knowledge is quite limited. The rich administrative data available in Colombia can help making progress on such important questions (potentially in partnership with institutions in charge of tackling corruption, such as the *Fiscalia* or *Procuraduria General de la Nacion*).

Back to the broad model that guided this research statement, some of the interventions that I mentioned aim at closing loopholes. But a strong determinant of the extent to which a society may reach a greater cooperation, or not, is the individuals' degree of altruism. I have been considering extending the basic intuition described in this proposal into a full theoretical model that highlights the growing role of altruism. The development of technologies leads to new loopholes, which may be closed by other technologies or interventions. This leads to the ambiguous long-term effect of HK increase described earlier. In this context, an increase in altruism leads individuals to having similar objective functions and hence increases the likelihood of cooperation. We owe a good share of our past development to cognitive ability and related technological progress, but altruism/empathy becomes a sine qua non condition to ensure future development. Despite this fundamental role, a large literature aims at understanding the determinants of cognitive ability, but economists invested very little in trying to understand the determinants of altruism. Hence the purpose of this paper would be to highlight the importance of this area of research, to which I would myself devote more time in the future.

Sincerely,

Rachid Laajaj

Figure 1: Citations (according to [Google Scholar](#))



**Table 1A : Prior Publications (with Los Andes Point system)**

Type	Año de Publicación	Nombre del producto	Coautores	Observación ( varía según el desarrollo)	Puntos por publicación
Artículo	2017	Laajaj R. (2017) Endogenous time horizon and behavioral poverty trap: Theory and evidence from Mozambique. Journal of Development of Economics		Tipo 3	10
	2015	(2015) Oil, Governance and the (Mis)Allocation of Talents in Developing Countries. Journal of Development Economics. V. 114. Pg. 126-141.	CHRISTIAN EBEKE LUC DESIRE OMGBA	Tipo 2	5.63
	2013	(2013) The Impact of Voucher Coupons on the Uptake of Fertilizer and Improved Seeds: Evidence from a Randomized Trial in Mozambique. American Journal of Agricultural Economics. V. 5. No. 5. Pg. 1345-1351.	MICHAEL CARTER DEAN YANG	Tipo 3	4.5
	2008	(2008) Disasters, Climate Change and Economic Development in SubSaharan Africa: Lessons and Directions. Journal of African Economies. V. 17. No. 2. Pg. 7-49.	AJAY CHHIBBER	Tipo 5	3
Capítulos de libro	2019	Laajaj R. (2018) Comment on Chapters 3 and 4, Chapter in NBER book The Economics of Poverty Traps (2019), Christopher B. Barrett, Michael R. Carter, and Jean-Paul Chavas, editors (p. 179 – 185). The Economics of Poverty Traps (ISBN 9780226574301) pp. 179-185. The University of Chicago Press		NBER	1.5
	2017	Laajaj R, Parra F. (2017) Colombia en movimiento: tierra, desarrollo rural y desigualdades. Colombia en Movimiento 2010-2013-2016 , Colombia.	Freddy Felipe Parra	N/A	0.3
	2013	(2013) The Inter-linkages Between Natural Disasters and Economic Development. En: The Economic Impacts of Natural Disasters. Pg.28-56. Oxford University Press: Oxford, England.	AJAY CHHIBBER	Tipo C	0.45
	2012	(2012) Securing Against Natural Disasters: Better Preparedness and Better Development. En: Security and Development. Pg. 171-206. Edward Elgar Publishing Cheltenham, England.	AJAY CHHIBBER	Tipo C	0.45
Working Papers	2019	Laajaj, Rachid and Eslava, Marcela and Kinda, Tidiane, The Costs of Bureaucracy and Corruption at Customs: Evidence from the Computerization of Imports in Colombia (February 11, 2019). Documento CEDE No. 2019-08.	Marcela Eslava Tidiane Kinda	Documento CEDE	0.5
	2018	Moya A, Laajaj R, Sanchez F. (2018) Equality of Opportunity and Human Capital Accumulation: Evidence from a Nationwide Scholarship in Colombia.	Andrés Moya Fabio Sánchez	Documento CEDE	0.5
	2017	Laajaj R. and Karen Macours (2017) Measuring Skills in Developing Countries. Estados Unidos.	KAREN MACOURS	N/A	0.7
	2014	(2014) Subsidies and the Persistence of Technology Adoption: Field Experiment Evidence from Mozambique. National Bureau of Economic Research: Cambridge MA, United States.	MICHAEL CARTER DEAN YANG	N/A	0.39
	2006	(2006) When Instability Increases The Effectiveness Of Aid Projects. World Bank Group: Washington DC, United States.	PATRICK GUILLAUMONT	N/A	0.53

TOTAL POINTS VALIDATED BY PUBLICATION COMMITTEE

**28.45**

Publication already accepted but not evaluated yet by Publication committed:						
Artículo	2019	"Challenges to Capture the Big Five Personality Traits in non-WEIRD populations" 2019, Forthcoming in Science Advances (First author)	Karen Macours, Daniel Alejandro Pinzon Hernandez, Omar Arias, Samuel Gosling, Jeff Potter, Marta Rubio-Codina, and Renos Vakis	Tipo 3	10	10
TOTAL POINTS EXPECTED AFTER VALIDATION BY PUBLICATION COMMITTEE:						<b>38.45</b>

**Table 2: Ongoing Research**

	Title	Co-authors	Journal of submission (pending or intended)	Date (sent or intended)
<i>A. Revise and Resubmit</i>				
1	Measuring Skills in Developing Countries	Karen Macours	Journal of Human Resources	Oct 2018
2	Yield gap or field gap? Reconciling yield gains in agronomic trials and African smallholder conditions	Karen Macours, Cargele Masso, Moses Thuita and Bernard Vanlauwe	Proceedings of the National Academics of Science (PNAS)	Oct 2018
<i>B. Sent, under review</i>				
3	Temporary Subsidies and the Adoption of Green Revolution Technologies by Mozambican Farmers and Their Social Networks	Michael Carter and Dean Yang	American Economic Journal: Economic Policy	Nov 2018
<i>B. Written, final adjustments before submission</i>				
4	Equality of Opportunity and Human Capital Accumulation: Motivational Effect of a Nationwide Scholarship in Colombia	Andres Moya and Fabio Sanchez	American Economic Review	June 2019
5	The Costs of Bureaucracy and Corruption at Customs: Evidence from the Computerization of Imports in Colombia	Marcela Eslava and Tidiane Kinda	Top 5 (to be decided)	July 2019
6	Directed vs. Enabling Interventions: A Study of Fertilizer Subsidies and Savings in Rural Mozambique	Michael Carter and Dean Yang	Economic Journal	August 2019
<i>C. In Progress (developing results or writing)</i>				
7	Customer Training Externalities and Technology Adoption: A Field Experiment on Formal Savings in Mozambique	Dean Yang	To be decided	Jan 2019
8	Natural resources, rent-seeking and career choice, evidence from the redistribution of royalties across Colombia	Cristhian Acosta	Journal of Public Economics	Jan 2019
9	What farmers learn: evidence from participation to agronomic trials in Kenya	Karen Macours	To be decided (likely first try in top 5 or top 10)	April 2019
10	Optimal information flows	Federico Gonzales	To be decided	End of 2019