Research Statement — Ryan B. Edwards

My applied microeconomic research seeks to understand economic development and environmental sustainability in developing countries, with a focus on agricultural trade and structural change. My projects typically combine large geospatial (e.g., remotely-sensed, satellite, and model-based data), administrative, and household survey datasets, and exploit experimental or quasi-experimental variation to measure causal effects.

My job market paper—*Export agriculture and regional development: evidence from Indonesia*—asks whether growth in agricultural exports helps or hinders poverty reduction in producing communities. Although economists generally agree on the aggregate benefits of trade, development strategies based on primary commodity exports remain highly contested. I measure the impacts of the world's largest modern agricultural expansion—that of Indonesian palm oil since 2000—on regional poverty and consumption. Identification exploits geographic differences in suitability for cultivation and rapid growth in global demand. The main finding is that increased palm cultivation delivered strong poverty reduction and broad consumption gains for producing regions. I trace the gains to rising returns to labor and land, and indirect effects through investment, local fiscal linkages, and rural public goods. These results offer a stark contrast to the popular view that the palm oil is not only harmful for the environment, but the economy and society. I also add to a salient literature on poverty-environment trade-offs by quantifying the forest loss associated with each percentage point of palm-driven poverty reduction. This paper extends the second chapter of my PhD dissertation, and I was recently invited to share the findings with members of the European Parliament at the Vatican following the European Union ban on palm oil-based biofuels.

The remaining two papers of my PhD dissertation shed light on other implications of resource sector-led growth. The first paper, published in *World Development*, uses international and subnational data to show how divergences from the Preston curve—the concave relationship between cross-country income and life expectancy that has long been of interest to economists, demographers, and epidemiologists—are partly explained by the size of the mining sector. I also show that this relationship exists for educational attainment. The third paper of my PhD uses multiple quantitative case studies to highlight the inverse relationship between the concentration of natural resource rents and local benefit diffusion, including spillovers to other sectors.

After completing my PhD in June 2016, I spent a year managing a project on sustainable palm oil production at Stanford's Center on Food Security and the Environment. My research program thus expanded from a focus on agriculture and natural resources to the intersection of these issues with the environment. *Fight fire with finance* is a randomized field experiment I designed and helped secure $250,000 in seed funding for during my year at Stanford. Our project has an ambitious goal: proof-of-concept for a new mechanism to operationalize climate finance and turn national-level agreements into guaranteed emissions reductions on the ground.

Payments for ecosystems services (PES) and conditional cash transfers (CCTs) are popular and often effective approaches to spur behavior change: paying people to undertake beneficial behaviors they otherwise would not. Usually, the behavior being "incentivized" benefits society, for example reducing deforestation with PES and vaccination and school attendance in CCTs. However, there remains limited evidence on the effectiveness of PES-type interventions, particularly in weak institutional settings, and no studies have focused on fire, which is the main way to clear land in the developing tropics.

Our experiment is set in the Indonesian province of West Kalimantan, ablaze as I write this statement. We estimate the effects of conditional cash transfers to village governments to reduce fire, offered as PES contracts to Indonesian village governments, with payment made after a year. Villages must not set any fire and promptly extinguish any natural fires to receive their ex-post payment. Hence, payment is conditional on performance, which we track with satellite data and field verification. Designed with the Indonesian Government within their existing fiscal architecture, we are poised to scale up this pilot study with more treatment arms (e.g., different payment levels and information-only treatments) if the initial results in January 2019 are promising. I am the first author, and we recently secured an additional $1,500,000 from the Norwegian Climate Fund to continue this work.

We prepared two other papers while setting up the experiment. *Causes of Southeast Asian Forest Fires* combines geospatial data on fire and local climatic conditions with longitudinal administrative data to identify the human causes of Indonesia's fires, which on a single day can emit more carbon than the U.S. economy. *Decentralization and the environment* asks how Indonesia's decentralization shapes recent agricultural growth and environmental degradation. It provides the institutional background for our experiment, motivating our focus on village collective action and enforcement. This paper is revised and resubmitted to the Royal Swedish Academic of Sciences journal *Ambio.*

Since moving to the Department of Economics at Dartmouth in July 2017, I have expanded my work on agriculture and the environment and pushed in several new directions. *Spillovers from agricultural processing* extends my job market paper to ask whether agricultural processing can help the transition out of agriculture. I use the proliferation of palm oil processors across Indonesia's outer islands as a natural experiment to study industrial onset and estimate economic spillovers from palm factories. Normally, factory-led industrialization happens in areas that are already growing, have good market linkages, and rising education. It is not clear whether factory-led development can succeed in places without these characteristics, which might be viewed as unprepared to industrialize. Identification exploits two key facts: that oil palm fruits must be processed within 24 hours of harvest, and factories place in areas most suitable for cultivation. I find that palm oil processing increases incomes, non-agricultural employment, and specialization in agriculture. Villages near factories also have more people, firms, and other economic and social organizations. Linked industries, infrastructure, and local market integration appear to reinforce agglomerations. This paper adds a unique new case—the first focused on rural regions in a large developing economy—to a growing literature emphasizing the importance of agglomeration externalities for understanding the birth of new towns, the spatial distribution of economic activity, and structural transformation.

I conclude this statement with a brief overview of five new research projects.

1. *Electoral conflict spillovers* uses Indonesia's first district elections as a natural experiment to measure impacts on electoral conflict in contiguous villages in neighboring districts without elections. Our results highlight the need for caution when assuming non-interference between nearby treatment and control units, and when using porous subnational borders as discontinuities. This is joint work with Yusaku Horiuchi and Daniel Suryadarma.

2. *The local amenity and crime impacts of marijuana retailers* provides new experimental evidence for a salient policy debate on marijuana legalization. Washington State held a lottery to allocate licenses to operate marijuana dispensaries. Comparing winners to losers, we find a decrease in property values, graffiti, recorded crime, and 911 calls near lottery winners. We benchmark our results against non-experimental approaches common in the literature. This is joint work with Brady Horn and Paul Zachary.

3. *Environmental impacts of agricultural processors on the frontier* aims to fill a key gap in our understanding of tropical deforestation by clarifying the timing and direction of the relationship between new agricultural supply chains and land clearing. Blending a new web-scraped panel tracing the proliferation of palm factories with satellite data on fire, tree cover, and land use change, I use a spatial difference-in-difference design to measure the environmental impacts of new factories.

4. *Plantation agriculture and child labor* extends my work on palm oil to look at impacts on child labor and human capital accumulation. Although child labor in the palm oil sector is of major concern to international aid donors and non-government organizations, there is currently is no credible empirical evidence on the matter. This is joint work with Eric Edmonds.

5. *Trade adjustment in a commodities-for-manufactures boom* seeks to disentangle the impacts of positive (export demand) and negative (trade exposure, in particular export competition with China and India) trade shocks on local labor markets, firms, and welfare. This paper aims to reconcile Indonesia's stalled structural transformation at the national level—colloquially referred to as "the middle income trap" or "premature de-industrialization"—with a growing body of work finding no evidence of any "Dutch disease" effects from recent mining and palm oil booms.

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