

# **MAKE GREAT MONEY, CHANGE THE WORLD (FOR THE BETTER)**

**David Hummels**

**Distinguished Professor of Economics**

**Dr. Samuel R. Allen Dean**

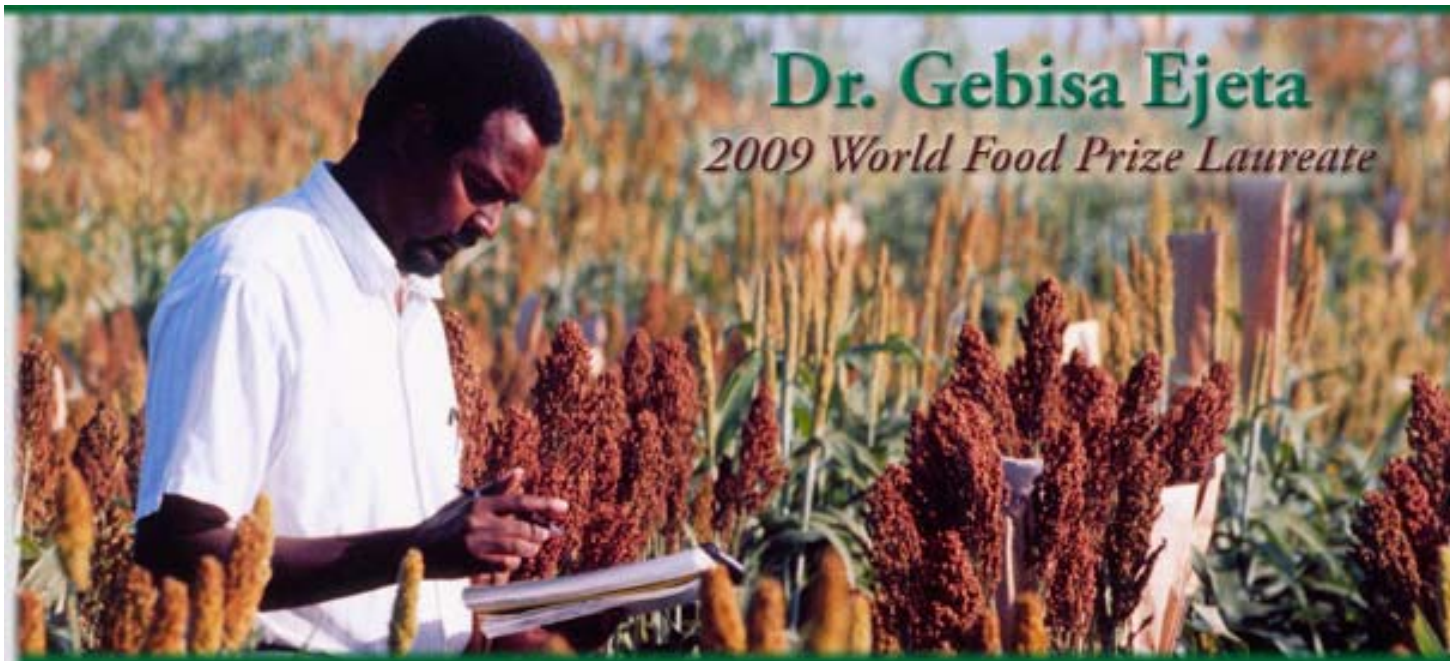
**Krannert School of Management**

**Purdue University**

## PhDs In Management And Economics

- Research questions with societal impact
- Why you should consider these degrees
- The market for new PhDs

# Research questions with societal impact



**Dr. Gebisa Ejeta**  
*2009 World Food Prize Laureate*

**PURDUE**  
UNIVERSITY®

*Announcing the*  
2017 WORLD FOOD PRIZE  
**LAUREATE**

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DR. AKINWUMI ADESINA  
NIGERIA

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2017 Laureate

A small inset photograph showing Dr. Akinwumi Adesina, wearing a light blue shirt and glasses, leaning over in a field of tall green crops, possibly corn, and examining them. Other people are visible in the background.A small inset photograph showing Dr. Akinwumi Adesina in a dark suit and a grey cap, being embraced by another man in a white shirt. They are both smiling.



How long does it take to go from  
Here  
to get to  
Here



## Why you should consider these degrees

- Research methods require sophistication in mathematics, statistics, computation



## Doing research in Mgmt and Econ

- Analytical modeling...characterizing the behavior of firms and consumers in mathematical terms and then solving systems of equations to predict complex behavior and interactions
- Empirical research...collecting, organizing data; experimental design; applying advanced statistical techniques to test model predictions, provide causal identification

# Common PhD Core Content

## Basics/Minimum Requirements

- Linear algebra
- Calculus and differential equations
- Basic probability theory/statistical analysis

## Topics from Mathematical Analysis that you will see in the core courses

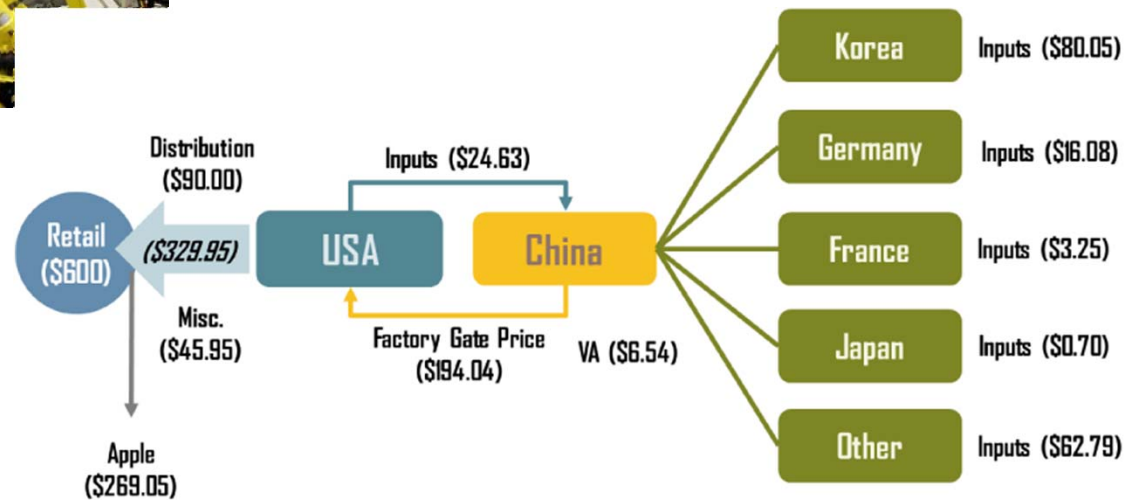
- Real analysis, Functional analysis

## Other Math/Stat topics in the core courses

- Optimization theory, Convex analysis
- Dynamic programming, stochastic processes
- Game theory
- Econometric modeling
- Programming (data handling, estimators, and computational modeling)



# Two huge changes to workforce: automation, offshoring



# Offshoring and Labor Markets

- Does offshoring help or hurt workers?
- Substitution effect v. productivity effect
  - Offshoring replaces some kinds of labor, but it also makes the firm more productive, expands sales
- Identifying these effects is confounded
  - The biggest, most productive firms are most likely to be engaged in trade

# The Wage Effects of Offshoring: Evidence from Danish Worker-Firm Data

David Hummels, Purdue University

Rasmus Jorgensen, University of Copenhagen

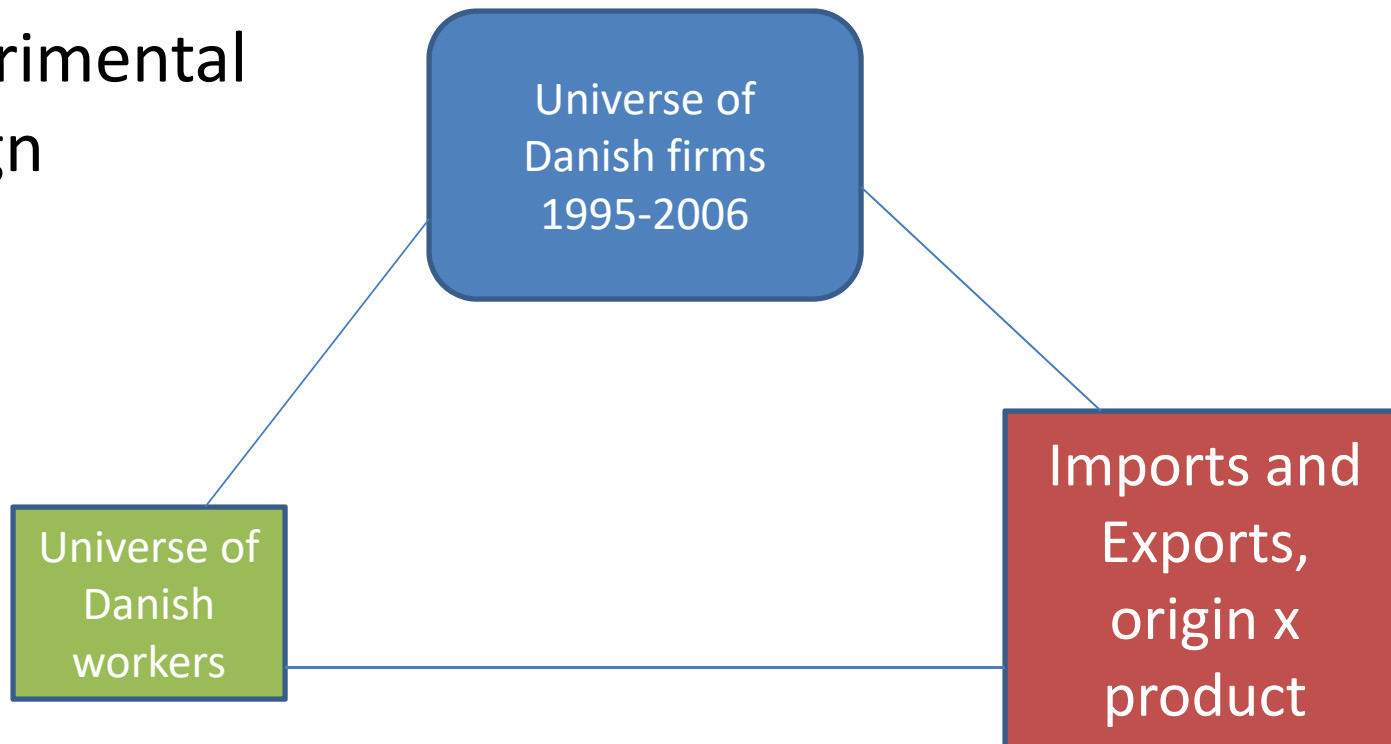
Jakob Munch, University of Copenhagen

Chong Xiang, Purdue University

# How do I answer this question?

- Theory: a mathematical model of firm decision making
  - Firms and consumers solve a problem of constrained optimization
    - Firms: “produce locally or buy foreign inputs”
    - Consumers: “which firms should I buy from”
    - Action!! a shock to the system changes these choices
  - Firms are heterogeneous and make different choices depending on their productivity
    - Need to understand analytically tractable distributions and how to manipulate them
    - Tell a story! Simple correlations are misleading...more productive firms are bigger and offshore production more

## Experimental design



Programming: link datasets...workers to firms, and firms to their sales and trade behavior

Action! Find exogenous (external to the firm) shocks to the trading environment that change firms decisions

What are the exogenous shocks? Changes in world demand and supply for products sold (or purchased) by the firm

Table 3: Firm-level Effects of Trade

	OLS	Firm FE	Firm FE, Predicted Offshoring	Firm FE Predicted Offshoring & Exports	
Dependent Variables	<u>Offshorer dummy</u>	log(offshoring)	log(offshoring)	log(offshoring)	log(exports)
	(1)	(2)	(3)	(4)	(5)
log employment	0.681***	0.044***	-0.106**	-0.205***	0.374***
log gross output	0.958***	0.082***	0.394***	0.143**	0.511***
log accounting profits	0.953***	0.066***	0.506***	0.00	0.908***
log (capital per worker)	0.161*	0.005	0.245***	0.119***	0.243**
log(wage bill per worker)	0.040**	0.014***	0.224***	0.131***	0.113***
log material inputs	1.162***	0.083***	0.195**	-0.140*	0.725***
log domestic material inputs	0.668	0.037***	0.355***	-0.082	0.847***
Share of high-skilled workers	-0.007	0.002*	0.091***	0.053***	0.055**
Materials/output	0.093***	0.005**	-0.049*	-0.063**	0.057*
Domestic materials/output	-0.043**	-0.011***	0.012	-0.03	0.073**

Simple statistical techniques: Correlate firm characteristics (left hand column) on trade

Big firms are more productive, they offshore more, they have more employment

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Advanced statistical techniques (fixed effect instrumental variables)

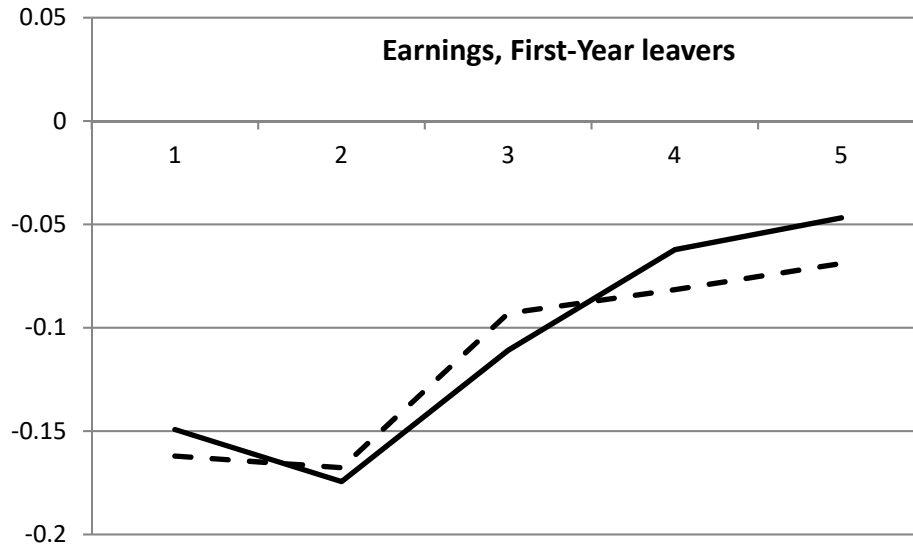
Isolate exogenous shocks...reasons firms change trade decisions that are unrelated to firm productivity... offshoring lowers employment and exporting raises employment



Table 5: Worker-Level Wage Regressions

Dependent variable:	Log hourly wage			
	FE		FE-IV	
	(1)	(2)	(3)	(4)
Log offshoring	-0.0025** [-2.43]	-0.0014 [-1.41]	-0.0222** [-2.56]	-0.0228*** [-3.70]
Log offshoring x high skilled	0.0060*** [5.59]	0.0061*** [5.57]	0.0510*** [7.71]	0.0523*** [7.78]
Log exports	0.0044** [2.02]	0.0060*** [2.82]	0.0493*** [4.48]	0.0531*** [7.63]
Log exports x high skilled	-0.0005 [-0.25]	0.0000 [0.02]	0.0008 [0.08]	0.0019 [0.18]

A rise in exports increases wages for all kinds of workers; offshoring raises wages for college educated workers but reduces it for all others



Two years after shock, wages are 17% lower

The previous results assume you keep your job.

What happens to people who are displaced? Large, persistent decreases in labor income.

Workers displaced due to offshoring suffer much more than those displaced for other reasons

# So, that's one paper

- Constrained optimization with a detour through manipulation of complex distributions
- Experimental design: in a complicated world, how do I isolate one effect from another
- Programming: collecting, cleaning, joining data; coding statistical estimation techniques
- Advanced econometrics: using state of the art estimators to achieve experimental design
- Data visualization...tell a story in simple graphs

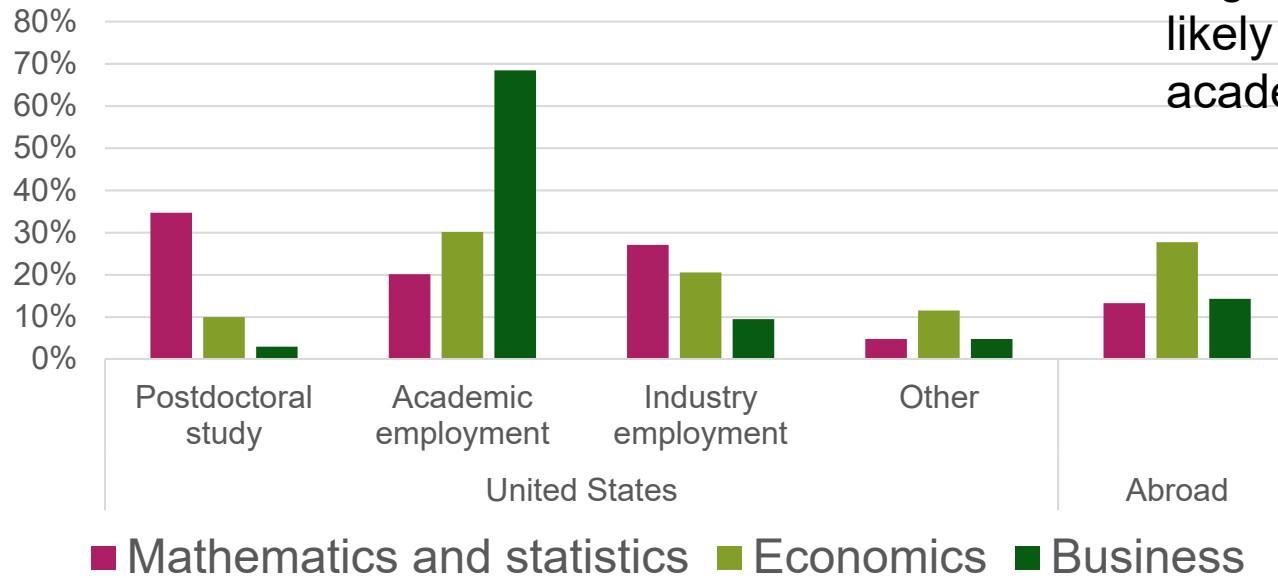
## Why you should consider these degrees

- Research methods require sophistication in mathematics, statistics, computation
- Business schools cannot deliver on their mission without a more diverse workforce.

# The market for new PhDs

# 2017 PHD PLACEMENT

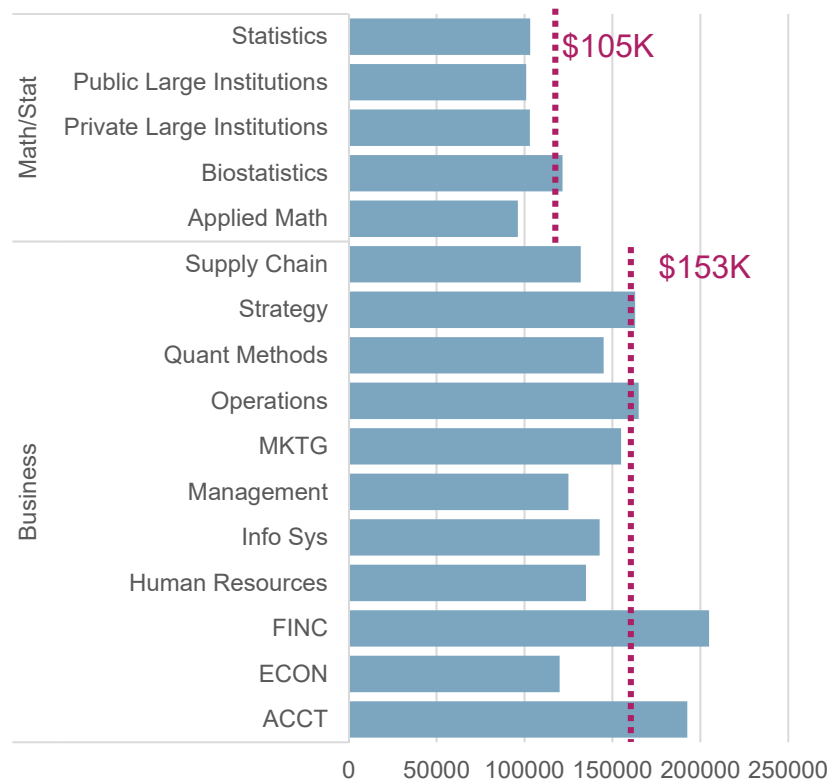
Business & Econ degrees much more likely to find immediate academic employment



Response Rate: 63% 74% 69%

# FACULTY SALARY COMPARISON 2017-18

New Assistant Professor (75<sup>th</sup> pctile)



Starting salaries average almost 50% higher in Business disciplines, 100% higher in Accounting and Finance.

This does not include summer salary – which adds another 20-25% and is typically included in contracts



**THANK YOU**

**Questions?**