Aggregate Effects of Collateral Constraints

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The goal of the paper is to quantify the welfare effects of collateral constraints.

- Estimate the causal effect of real estate prices on investment.
- Estimate a model of factor demand under financing frictions.
- Embed this model into a general equilibrium framework.
- Large welfare effects of relaxing external equity constraints.

Is the question interesting?

- Yes!!
- We want to understand the mechanisms and implications of estimated elasticities.
- It is refreshing to see it done in a methodical way.

Outline

- The model in words and graphs.
- Comments
  - Two conceptual issues
  - Two important details
  - A bunch of other items

The real side of the model is straightforward.

- Partial-equilibrium, discrete time, infinite horizon, profit maximization problem
- Firm buys capital and labor to produce output
- Demand/productivity shock to the production function
- Adjustment costs on capital but not labor

So is the financial side.

- No external equity finance. **This is OK!**
- The firm is endowed with land
  - Cannot be bought or sold
  - Subject to an exogenous price shock
  - Can be used as collateral for, ...
- Tax-advantaged risk-free debt finance
- Cash (negative debt)

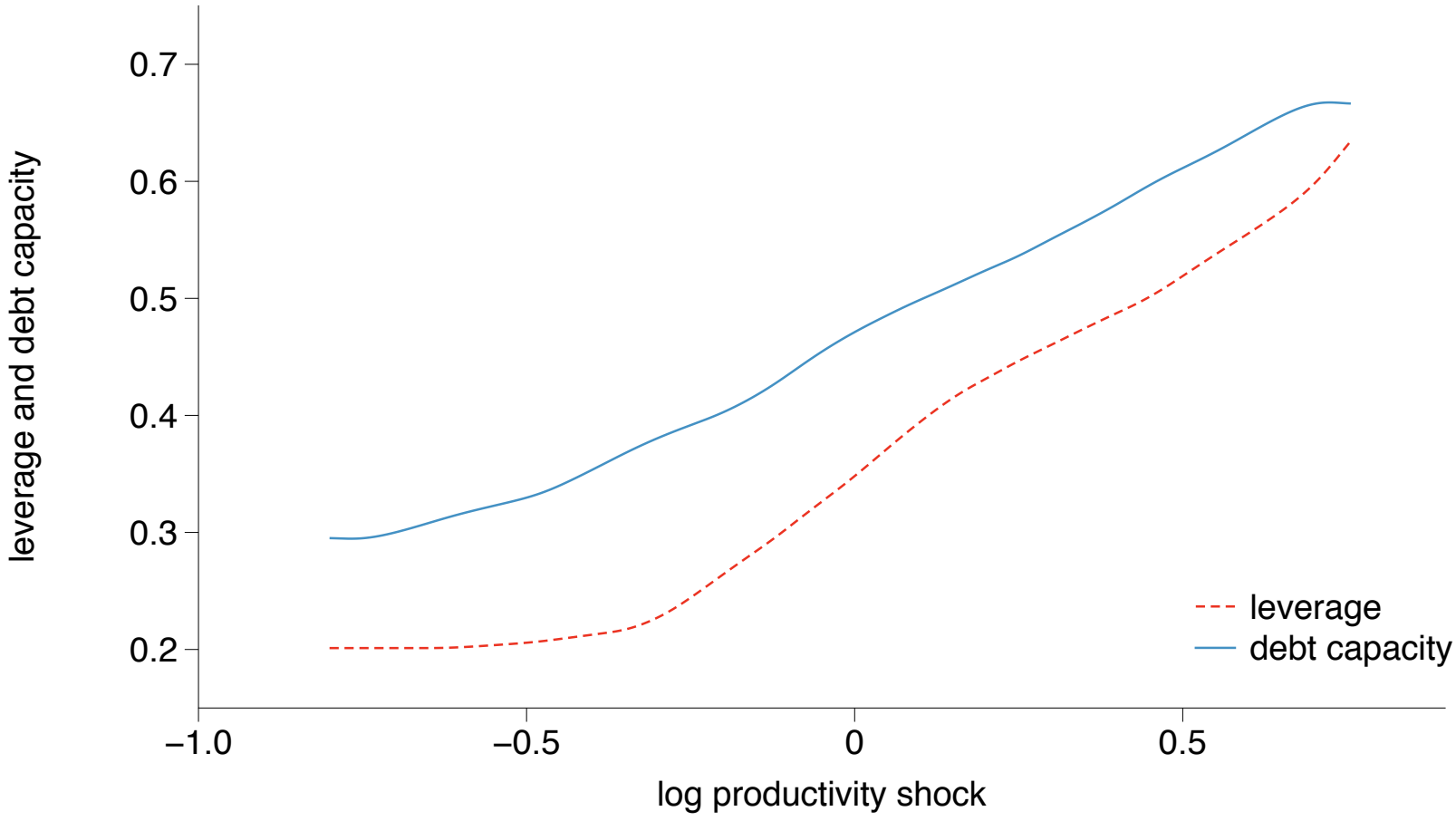
There are three important financial frictions.

- Tax advantage of debt.
- No external equity.
- **Debt has to be secured by collateral.**

The firm has a strong incentive to preserve debt capacity.

- With endogenous investment/labor demand,
- and collateral,
- and no other sources of external finance,
- You want to keep your powder dry in case a good opportunity pops up tomorrow.

This is what capacity preservation looks like.



The counterfactuals are very big money!

- *"The estimates imply that lifting financing frictions would increase welfare by 9.4% and aggregate output by 11%."*
- These are very large numbers.
- Where do they come from?

Too many calibrated parameters!

- Quantitative statements are always made with regard to some particular data set.
- We are not doing chemistry. There is no Avogadro's number in economics.
- When parameter A comes from one study and parameter B comes from a different study and parameter C is just set to a nice round number, it is hard to understand what any quantitative statements mean.

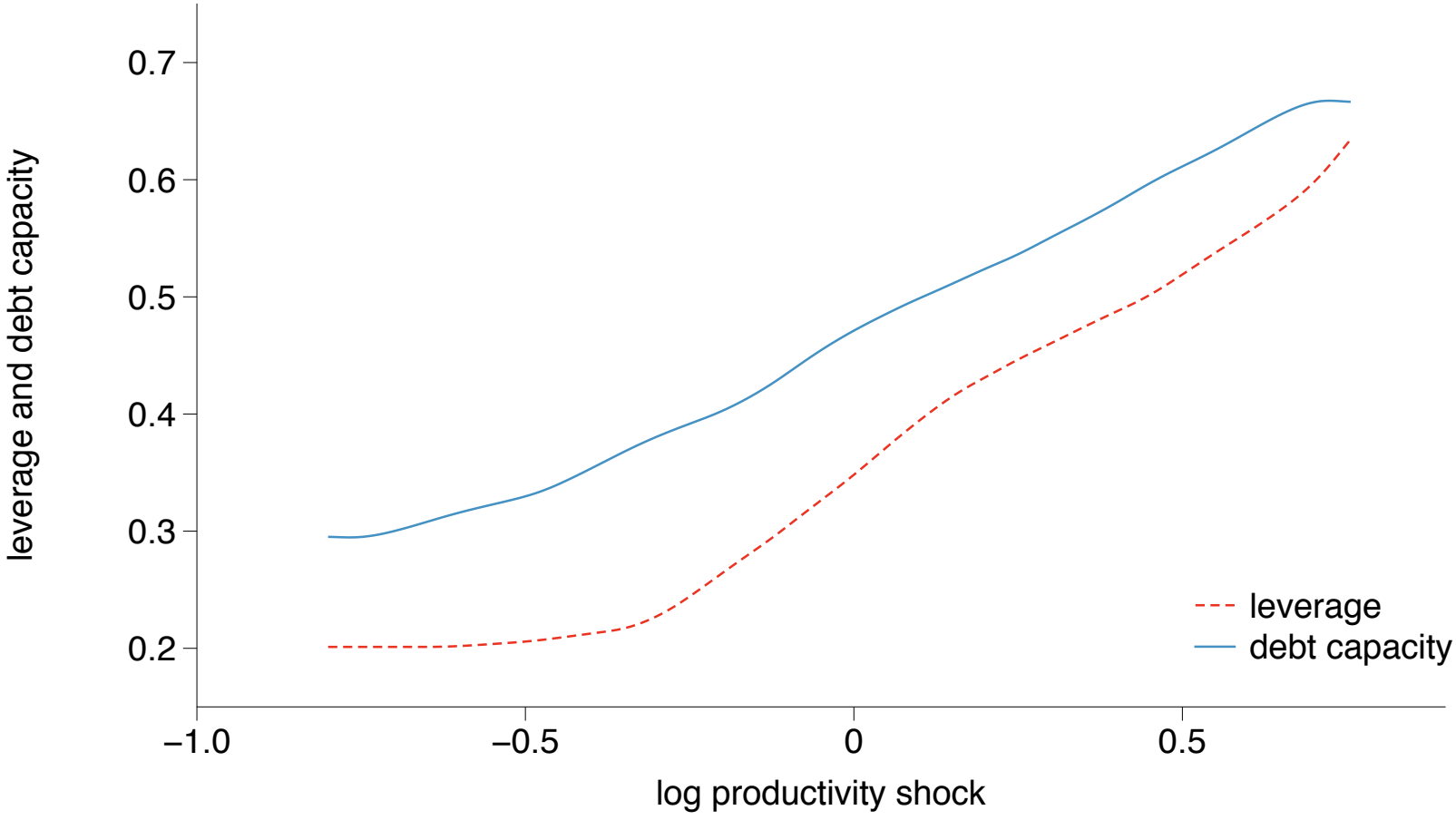
This is easy to fix.

- Just estimate everything. It's not that hard any more.

The counterfactual is "partial."

- Remove the constraint on external equity finance.
- Leave in place
  - the collateral constraint
  - the debt tax advantage
- What happens?

Before


leverage and debt capacity
0.7
0.6
0.5
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−1.0
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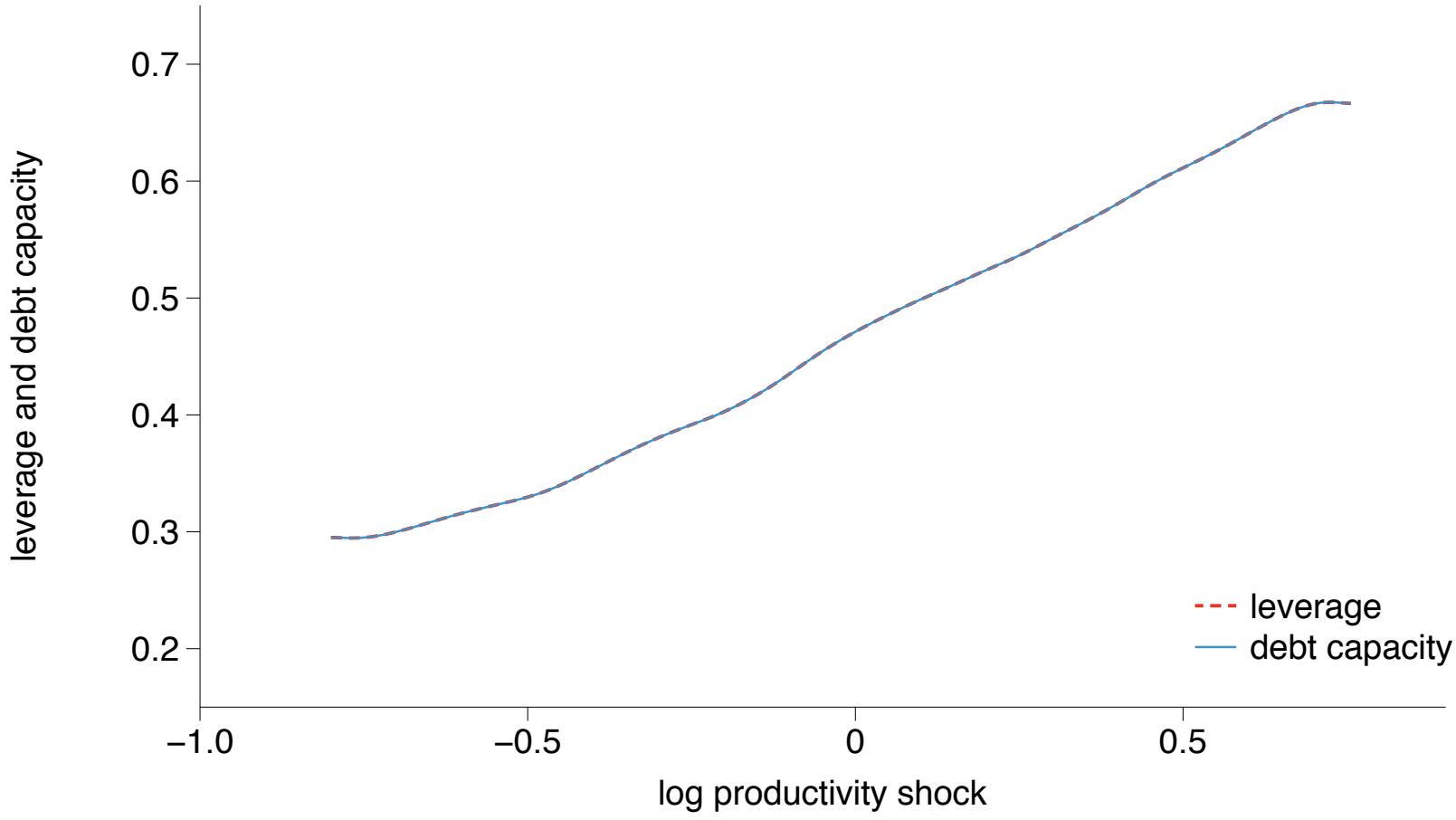
0
0.5
log productivity shock
leverage
debt capacity

After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log productivity shock
leverage
debt capacity

Solution: Go full Modigliani-Miller!

- Remove all financial frictions.
- Magnitudes will likely be smaller

Do you need exogenous variation to do SMM?

- *"An important contribution of this paper is to base the estimation of a model [...] on a well-identified, reduced-form moment."*

- Is this a contribution?

What does "identification" mean in reduced-form work?

- Does
  - x affect y
  - y affect x
  - z affect both y and x?
- Exogenous variation is very useful for answering this kind of question.
- It is less useful for understanding the mechanisms that drive causal elasticities.

But structural work does not usually identify elasticities.

- The goal is to estimate model parameters.
- Sometimes exogenous variation **can** be useful for this.
- If part of an economic model can be represented as a regression.

What does "identification" mean in structural work?

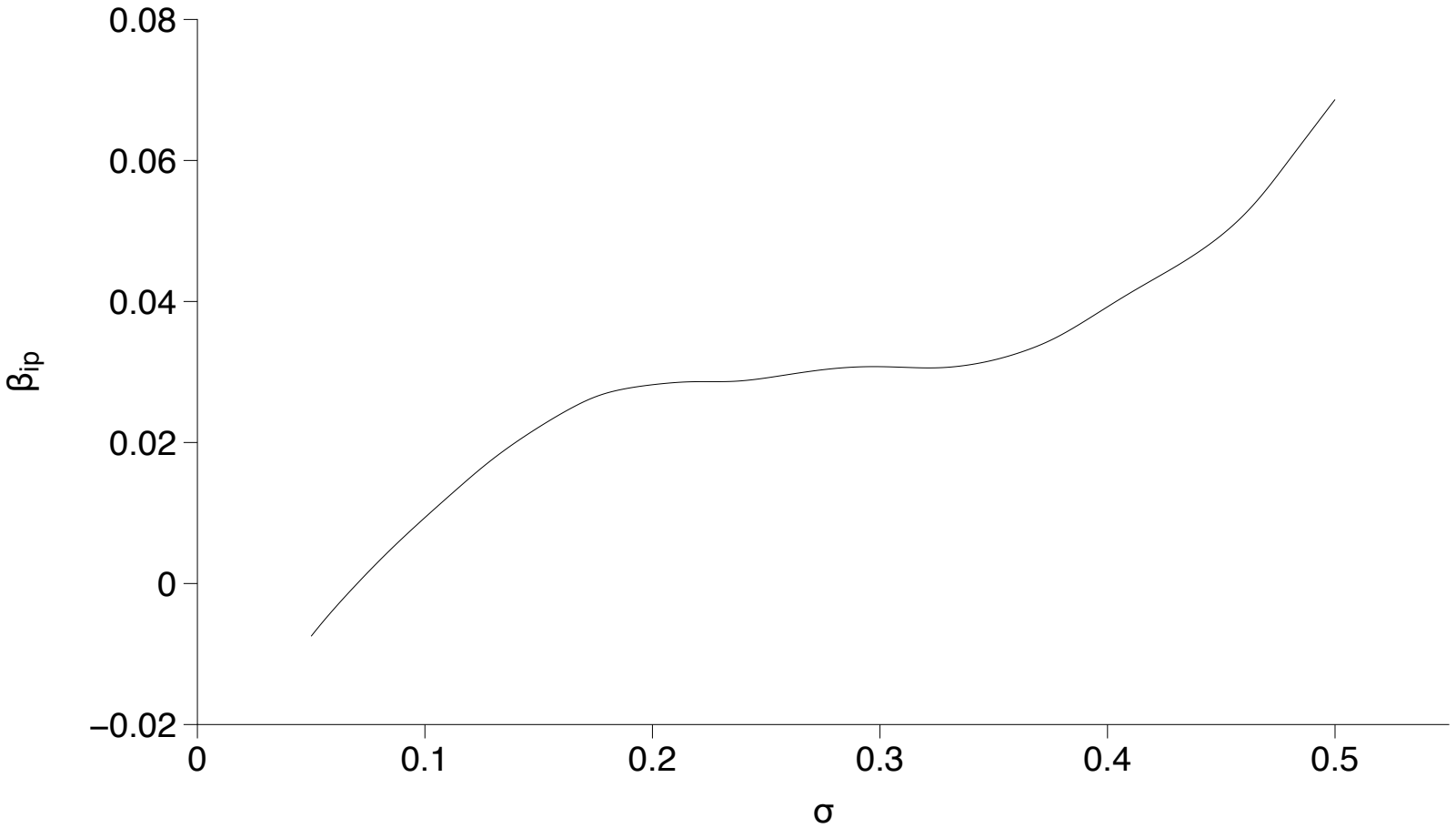
- Does the econometric objective have a unique minimum (maximum) at the true parameter vector?
- Changes model parameters predict changes in the data.
  - Unique mapping from parameters to data moments.
  - Precisely estimated moments
- All parameters can affect all moments, but the mapping has to be one-to-one and onto.

The authors go one step further.

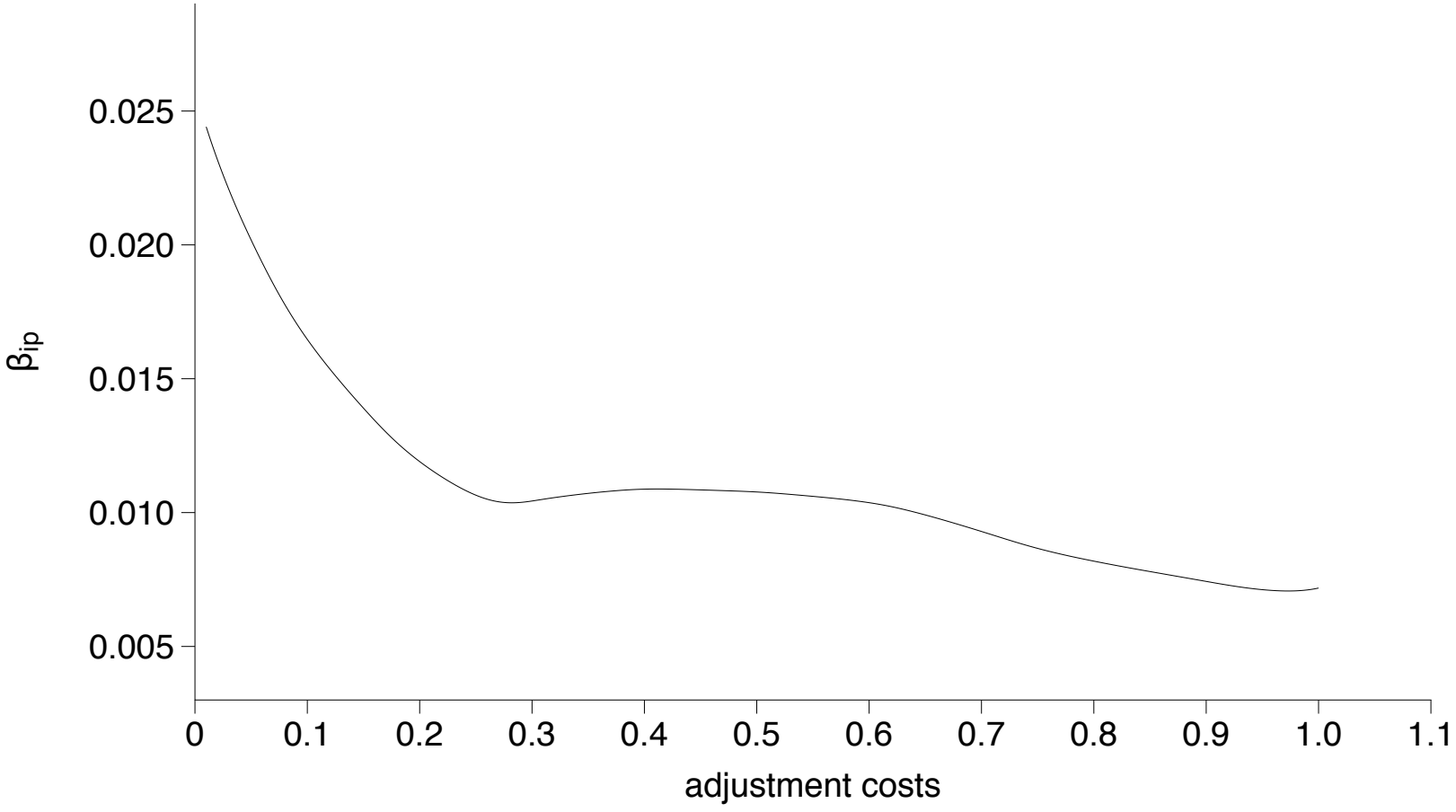
- *"causal estimates coming from the reduced-form literature are in principal purely attributable to financing constraints."*

- This path from parameter to moment is **uncontaminated** by other parameters.

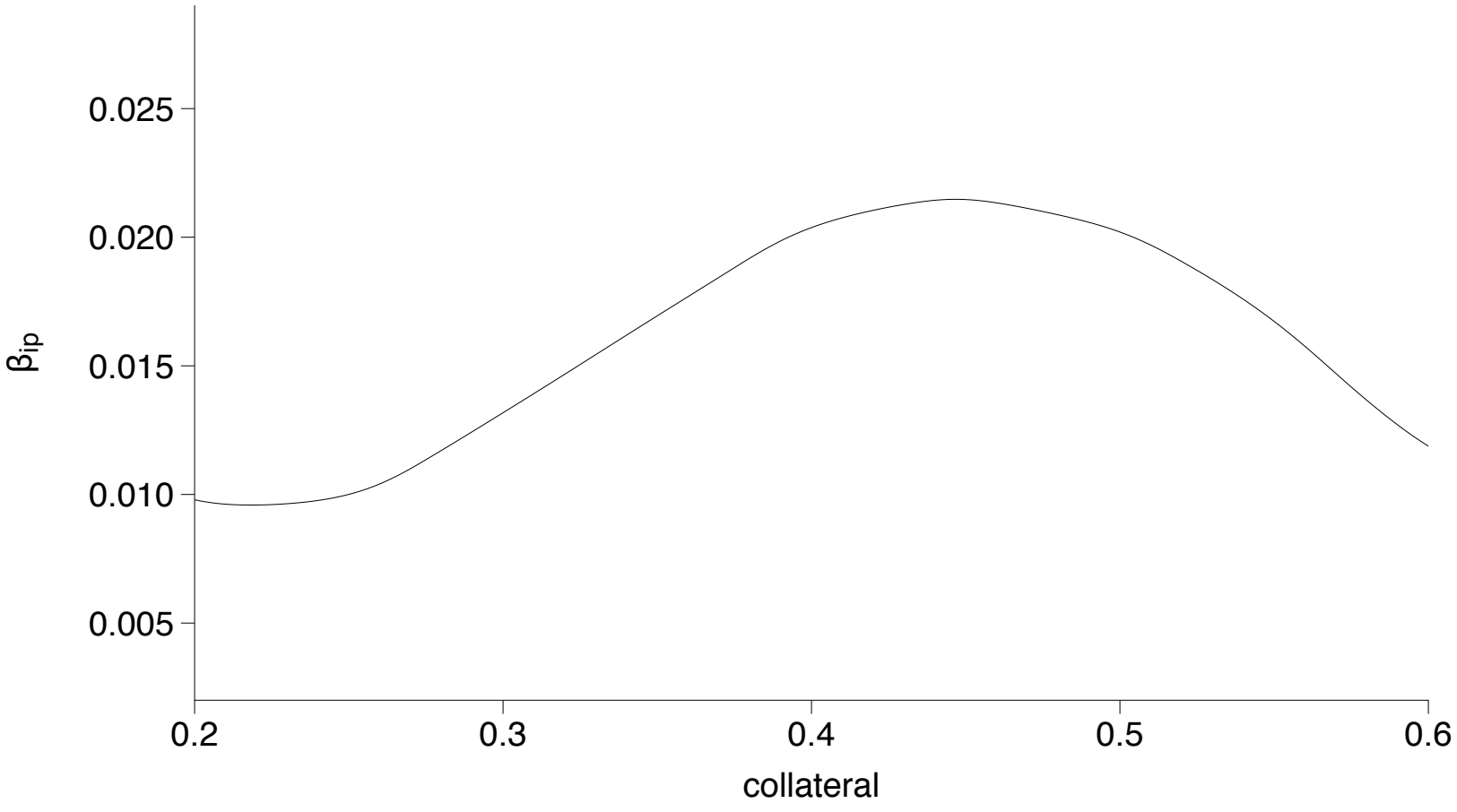
Shock volatility affects this causal elasticity



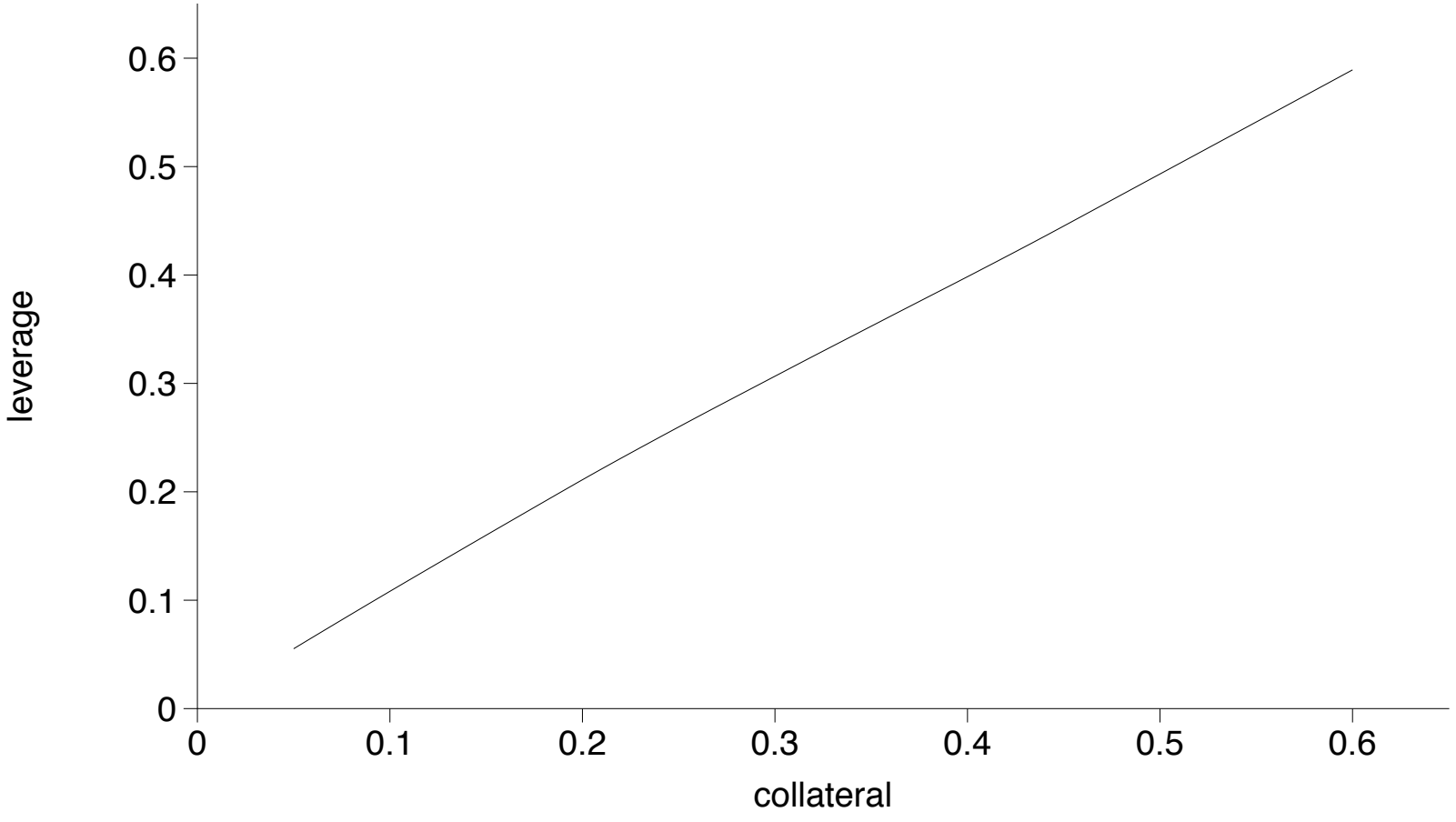
Investment adjustment costs affect this causal elasticity



The collateral parameter affects this causal elasticity



The collateral parameter affects leverage



There is no clear path from elasticity to parameter

- Real estate prices are exogenous in the model.
- Investment responses to real estate prices depend on the entire structure of the model.
- Not just financial constraints.
- Strong analogy to the search for mechanisms in reduced-form studies.

Causal elasticities are not necessarily helpful!

- Kahn and Whited (2017):
- Compare SMM estimators of a closely related model
  - causal elasticity
  - endogenous elasticity
- The performance of the two estimators is nearly identical!
- In both cases,
  - Multiple moments and multiple parameters interact.
  - Identification leans on the structure of the model.
- Identification **always** leans on assumptions.

What could and should the authors do?

- If there were a unique mapping from the causal elasticity to financial frictions:
  - Just run a regression!!!!
- Because there is not:
  - Use as much information as possible.
  - Use both real estate price and leverage moments.

The standard errors are wrong and sometimes missing

- They bootstrap the weight matrix and the standard errors.
- No standard errors on the moment conditions.

CLUSTER!

- Do not bootstrap covariance matrices or standard errors. (Horowitz 2001, *Handbook of Econometrics)*

- Use the clustered covariance of the data moments to make the weight matrix.

  `https://github.com/J-Kahn/estimating-dynamic-corporate`

- Excellent finite sample properties (Bazdresch, Kahn and Whited 2017, RFS, forthcoming)

I cannot replicate the model or the estimation.

- Not even close.
- The high shock variances in the estimation results cannot be right.
- If I plug those into the model, I get very very strange results.

The sensitivity of investment to real estate prices is tenuous.

- It was really negative with your parameter estimates.
- With more conventional parameters, it was sometimes positive and sometimes negative.
- It was **POSITIVE** when I relaxed the no-equity-finance constraint.

I still think real estate prices are endogenous.

- If they are exogenous in the model but not in the data, you cannot use SMM with this elasticity.
- Just make them correlated in the model.

Multi-start/Nelder Meade algorithms work very poorly.

- You don't have to evaluate the model nearly as many times, but you are much much less likely to get to the bottom of the hill.
- There is no easy way to do this.
- Differential evolution. Particle swarm. Simulated annealing.

I did not understand the GE computations.

- I have done these, but not the way you describe.
- You have two relative prices: the wage and interest rate.
- The interest rate clears the goods market.
- The wage clears the labor market.
- Use bisection to clear both markets at once.
- This might be what you are doing, but I could not tell.

What about Jermann and Quadrini!!

- You should cite these guys and relate your work to theirs.
- Their 2012 paper is especially closely related.

Go beyond elasticities and understand mechanisms.

- Spend more time on model intuition.
- Fix the estimation and counterfactuals.
- The result will be great!