Local Economic Spillovers from Water Trade

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Motivation

- Water markets greatly improve the efficient allocation of scarce resources (Rafey 2023).

Motivation

Men burn copies of the Murray-Darling Basin guide. *(Gabrielle Dunlevy: AAP)*

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- Local harms in selling communities (Wheeler et al. 2024)

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"As water moves from one region to another, the economic consequences will flow. Where the water goes, the economy will follow."

Community member from Pretty Pine, NSW
(Sullivan 2019)

Motivation

- Water markets improve efficiency (Rafey 2023)
- Local harms in selling communities (Wheeler et al. 2024)

"If you grow a crop you use local contractors, local providers of chemicals, seed, agronomy, accountants, you contribute to wages and that money goes around [but] if you just take your money from trading water, that money doesn't go around."

Irrigator from Pretty Pine, NSW
(Sullivan 2019)

Motivation

- Water markets improve efficiency (Rafey 2023)
- Local harms in selling communities (Wheeler et al. 2024)

"I'm not sure the Imperial Valley is a big believer in water markets," Shields said. "We're a big believer in protecting our community."

Manager of Imperial Irrigation District, CA
(Smolens 2023)

Motivation

- Water markets improve efficiency (Rafey 2023)
- Local harms in selling communities (Wheeler et al. 2024)

"From a community point of view, perhaps we need to consider maintaining water in the regions, but then as a business person would I like to be restricted to sell my water only within my region when I might be able to earn double for it downstream? It's about having your cake and eating it too."

Business Chamber VP from Pretty Pine, NSW
(Sullivan 2019)

This Paper

"From a community point of view, perhaps we need to consider maintaining water in the regions, but then as a business person would I like to be restricted to sell my water only within my region when I might be able to earn double for it downstream? It's about having your cake and eating it too" (Sullivan 2019)

Research Questions

1. What are the **local economic spillovers** from water trade?
2. How large are community impacts relative to **gains from trade**?
3. How do we better **design markets** with this in mind?

This Paper: Approach

- **Event Study: DiD-IV Approach**
  - Use MDB's water management reform as a natural experiment for water trade.
  - Instrument for propensity to trade with soil characteristics.
  - Estimate local economic impacts of trade.
- **Communal Hedonic Value of Water: Residential Choice Model**
  - Leverage migration flows to estimate residential choice utility.
  - Allow households to have direct preferences over water in the community.
- **Private WTP for water: Agricultural Production Functions**
  - Simple Cobb-Douglas production function estimation.
  - Back out MWTP for water.
- **Policy and Market Design**
  - Combine private and communal WTP for water.
  - Explore how correlation and heterogeneity affect potential policy instruments.
  - Focus on a mechanism to achieve Pareto-gains.

Contributions

- **Distributional Consequences of Trade:** Apselund (2025), Calliendo et al. (2019), Fajgelbaum and Khandelwal (2014), Autor et al. (2013), Kovak (2013).
  - Environmental input market where distribution is first-order.
  - Integrate event-study, migration model, and production to analyze tradeoffs.

- **Place-Based Policy:** Slattery (2025), Kashner (2025), Kline and Moretti (2013), Glaeser and Gottlieb (2008).
  - Place-based policy under exchange where losers are more pronounced.

- **Water Market Design:** Akhundjanov et al. (2025), Ferguson (2025), Ferguson and Milgrom (2024), Hagerty (2025), Rafey (2023), Regnacq et al. (2016), Colby (1990), Hanak (1990).
  - Study key bottleneck to policy reform in world's largest, most active water market.
  - First market-wide analysis of distributional impacts.

Roadmap

1. Water in Australia
2. Data and Descriptive Statistics
3. Local Economic Effects: Event Studies
4. Communal Value of Water: Residential Choice
5. Market Value of Water: Agricultural Production
6. Market Design and Counterfactuals

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Water in Australia: Murray-Darling Basin

- Largest basin and most productive agriculture.
- Dry growing season $\Rightarrow$ irrigation dependent.
- Millenium Drought $\Rightarrow$ political will.
- **Water Act of 2007**
  - Overhauled water management.
  - Clarified water rights.
  - Removed trade barriers.

Water in Australia: Murray-Darling Basin

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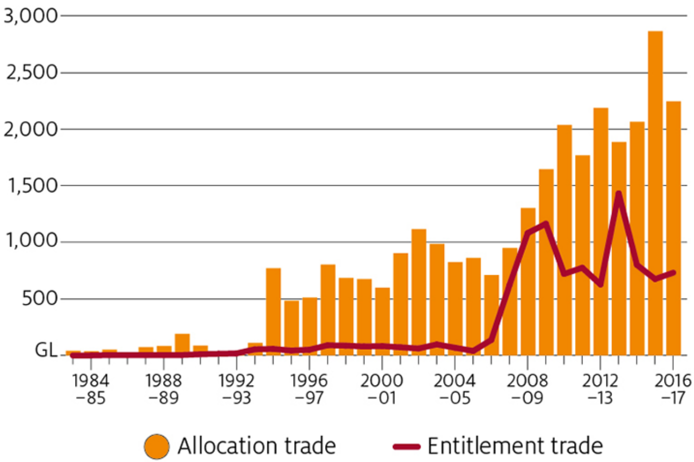
- **Water Act of 2007**
  - Overhauled water management.
  - Clarified water rights.
  - Removed trade barriers.
- **Most active and valuable** water market.
  - 60% of farms have traded.
  - **$1.9 billion gains** from trade (Rafey 2023).

Use Water Act as Natural Experiment

- **Ideal Experiment:** Random permanent change is water rights.
- **Natural Experiment:** Water Act of 2007's liberalization of trade ⇒ ≈ 20x increase in permanent transfers.
- **Intuition:** Perisistent factor misallocation unlocked by policy.



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Data

- **Water usage:** SA1 $\times$ Year (2001-2020)
  - Australia's Terresetrial Ecosystem Research Network (TERN)
  - Combine applied ET measures from Sentinel-2 and Landsat satellite data
  - Measures average evapotranspiration (30m-level) in mm/day.

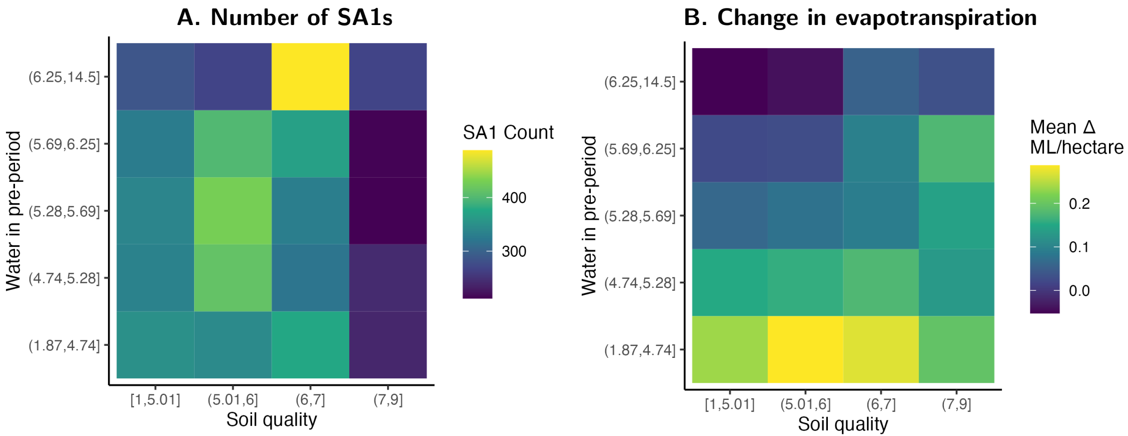
- **Land Characteristics:** SA1 in 2001
  - Soil and Landscape Grid of Australia at 90m pixel
  - Soil pH and depth for 161k points (observed and predicted with ML)

- **Census every 5 years:** SA1 $\times$ Year (1996-2021)
  - Population, rent, mortgage, wages, jobs.
  - Migration flows between region.

- **Property Sales:** Property $\times$ Transactions (1995-2024)
  - All transactions and parcels in NSW ($\approx 1/3$ MDB's population)

- **Other**: voting by poll station, mortality causes, deaths by location.

Ex-ante factor misallocation



Note: Soil quality is from a harmonized land capability mapping in [Adams & Engert 2023]. Average change in SA1 evapotranspiration (ML/hectare). Distribution Geography SoilGeography

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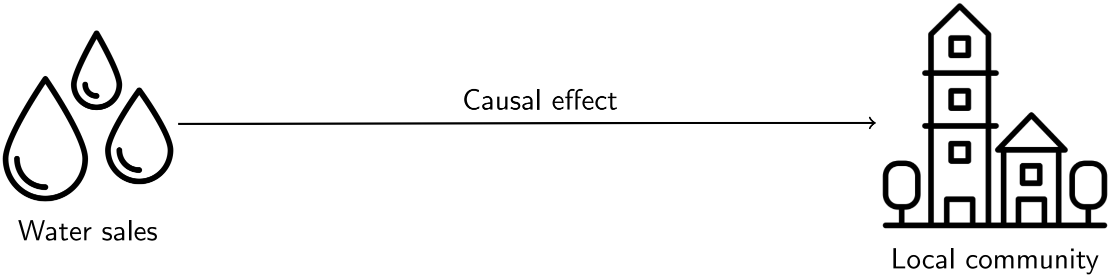
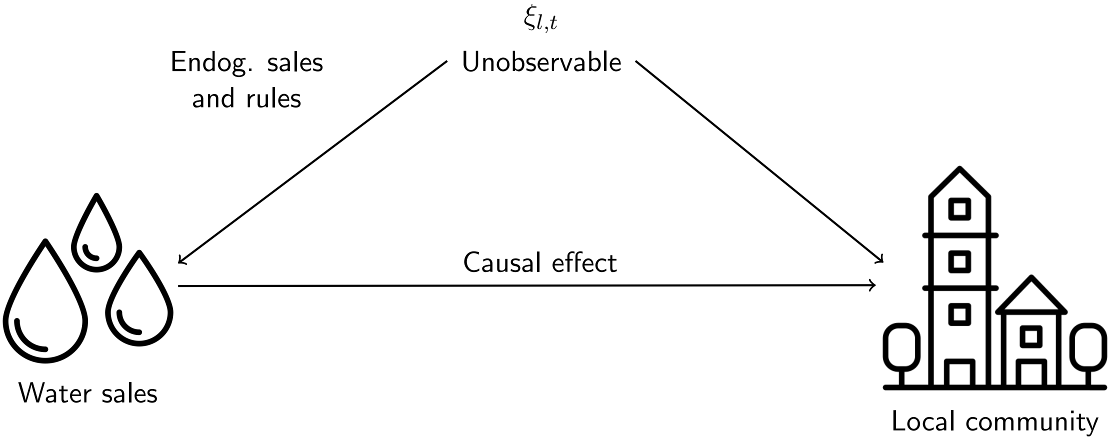
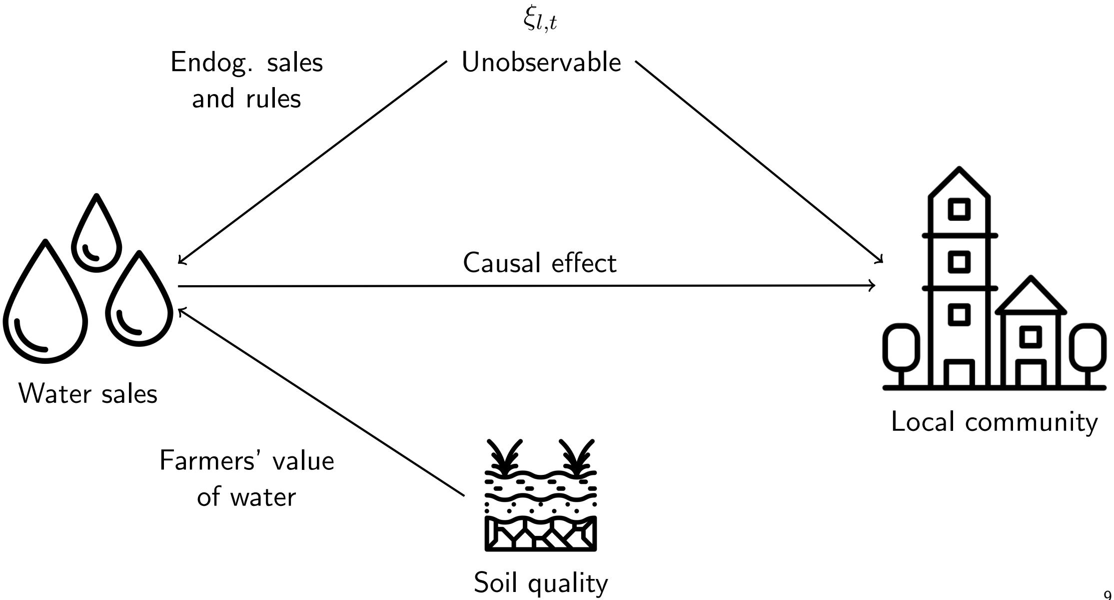
Event-Study Design: IV Intuition FirstStage



Event-Study Design: IV Intuition FirstStage



Event-Study Design: IV Intuition FirstStage



Event-Study Design: Instrumented Diff-in-Diff

DiD IV approach

$$\log(Y_{l,t}) - \log(Y_{l,'06}) = \tau_t \Delta\hat{W}_l + \phi_{d,t} + \varepsilon_{l,t}$$

$Y_{l,t}$: Outcomes in location l in year t (household income, rent, mortgage, and population)

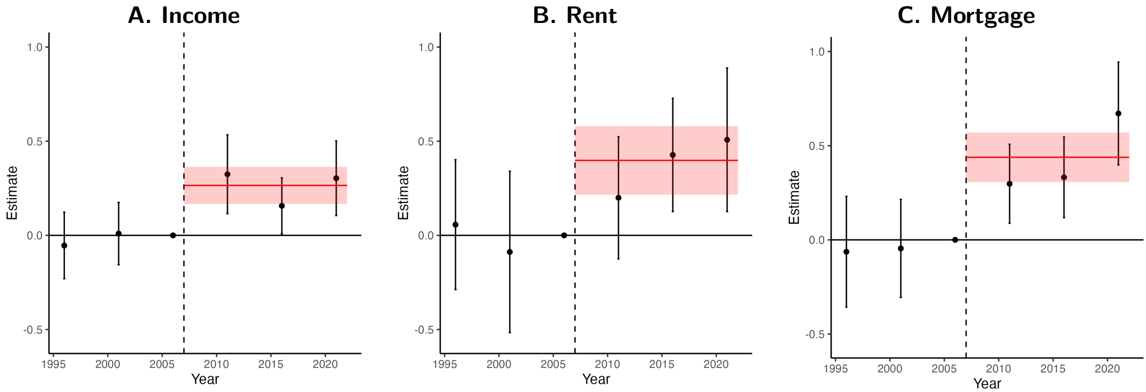
$\Delta\hat{W}_l$: Average difference ($\overline{W}_{post} - \overline{W}_{pre}$) in evapotranspiration per hectare

IV w/ natural soil characteristics (pH, pH^2, $\sqrt{\mathrm{Depth}}$)

τ_t: Effect of change in water

$\phi_{d,t}$: Water-district fixed effect

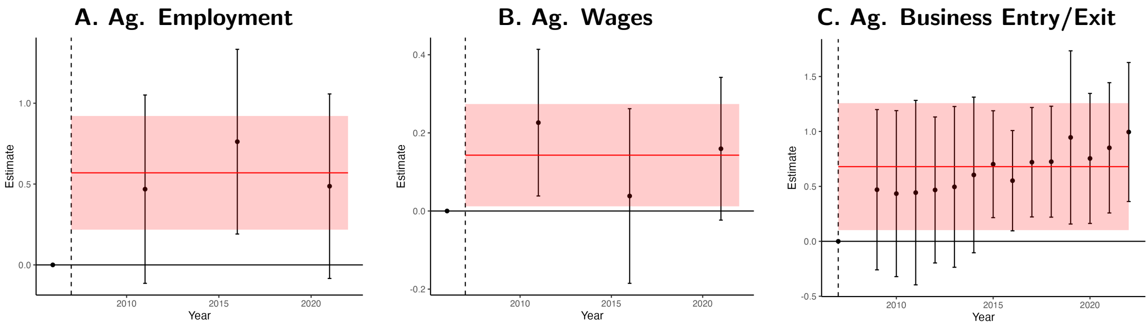
Event Study Results for Local Economic Indicators



Notes: Effect of permanent increase in ET/hectare on income, rent, and mortgage. ≈5,300 SA1 obs. each year.

TableIncome TableRent TableMortgage

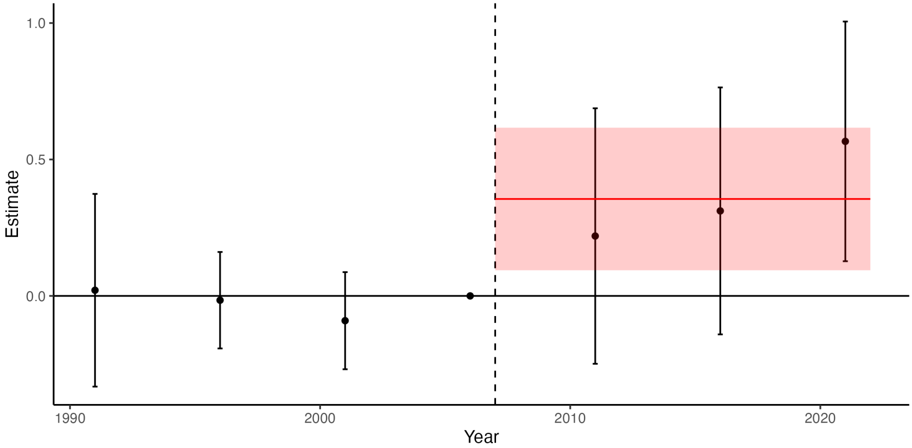
Agricultural Labor Market Effects



Note: Effect of permanent increase in ET/hectare on agricultural employment, wages, and entry/exit. ≈4,300 SA1 obs. each year.

AgJob AgWage

Populations respond more slowly to shift in water



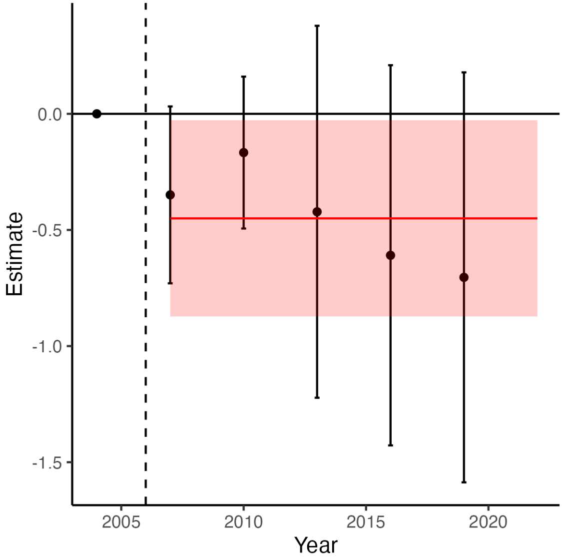
Notes: Effect of permanent increase in ET/hectare on SA1 population. Table

Water losers shift politically

Water losers shift politically

- **Labor:** Campaign on MDB plan regulation and overhaul
- **Liberal-National:** "Continue to advance the Plan as it stands"
- Outcome is Log(Labor Vote Share)
- Polling data SA2 × year (2004-2019)

Table



Deaths of Despair

Water fights

Much of the world is desperately short of fresh water. Are future water wars inevitable?

BY NANCY MACDONALD JULY 6, 2009

Every few days, another farmer commits suicide in Australia's Murray-Darling Basin, the agricultural heartland. Many, according to Australian evolutionary biologist Tim Flannery, haven't had any water in almost four years—in places, the allocation of irrigation water has been cut to zero. Their farms have dried up, leaving a dusty, wind-whipped scrubland. Cattle bellow from hunger through the night. "Despair is an enormous problem," says Flannery. "There is no sign the situation will ever improve." Government has compiled a suicide watch list.

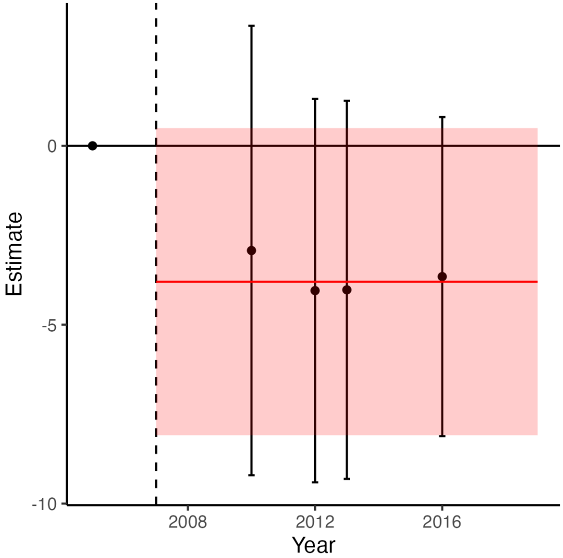
Deaths of Despair

- Suicide from decline of farming towns
- Deaths of despair rate (SA2 $\times$ year)
- Years: 03-07, 08-12, 10-14, 11-15, 14-18

$$\text{asinh}(D_{lt}) - \text{asinh}(D_{l,2005})$$

- At mean, 34% reduction in deaths.
- Noisy, but suggestive evidence.

Table



Summary of evidence

- Effects on income, housing costs, employment, politics, and deaths of despair.
- **Design goal:** trade-off community impacts with productive reallocation.
- **Problem:** how do we summarize the community impacts of trade?
- Want the community's willingness-to-pay to keep water in town.
- **Strategy:** Residential choice model with hedonic estimation of WTP for water.
- To motivate this approach, we demonstrate the impact of water trade on home prices.

What happens to home prices?

Resale IV approach Data

$$\log(p_{l,t}) = \tau_t \Delta\hat{W}_l + \phi_i + \gamma_{d,t} + \varepsilon_{l,t}$$

$Y_{l,t}$: Outcomes in location l in year t (household income, rent, mortgage, and population)

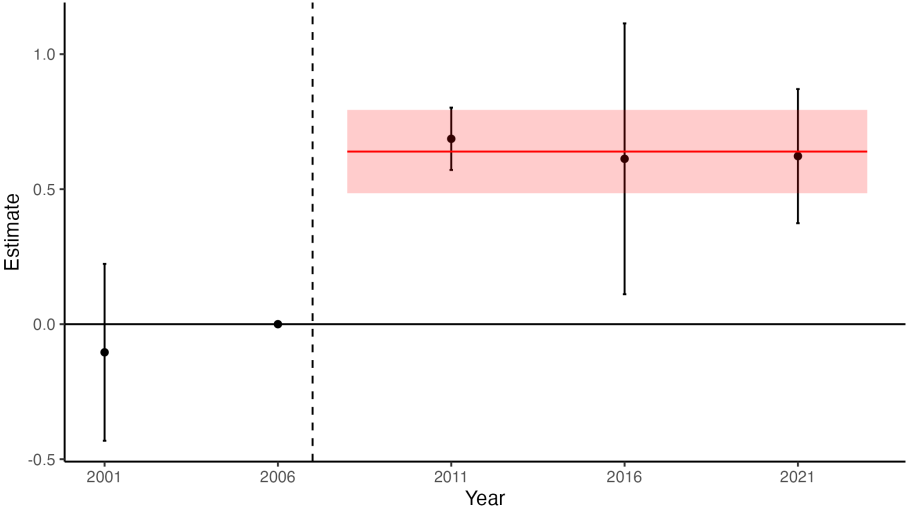
$\Delta\hat{W}_l$: Instrumented average difference in evapotranspiration per hectare

τ_i: Effect of change in water

ϕ_i: Unit fixed effects

$\gamma_{d,t}$: Water-district fixed effects

What happens to home prices? OLSFig Table



Notes: Effect of permanent increase in ET/hectare on home resales in NSW.

Roadmap

Estimate Communal Value of Water: Residential Choice Model

- Missing (public goods) market for community to pay farmers to keep water.
- How much is a community willing to pay?
- Estimate the hedonic value for water in the community with a residential choice model.
  - Map local water, housing price, income, and migration chance to welfare (in $)
  - Households have different preference for locations
  - Heterogeneous preference for water & price (by density)
  - Income elasticities
  - Estimate using SA2 $\rightarrow$ SA1 migration flows.

Model of Residential Choice: Utility

- **Model:** Extension of Bayer et al. (2007) with locational substitution patterns.

- **Utility:** Representative i from origin $o(i,t)$ SA2 gets utilty from moving to SA1 d in t.

$$u_{i,d,t}^{o(i,t)} = \underbrace{\gamma_d^{o(i,t)}}_{\text{location prefs.}} - \underbrace{\alpha_d \log(p_{j,t})}_{\text{housing price}} + \underbrace{\omega_d W_{d,t}}_{\text{water prefs.}} + \underbrace{\theta \log(I_{d,t})}_{\text{income}} + \underbrace{\eta_{wd(d),t}}_{\text{district-year FE}} + \underbrace{\xi_{d,t}^{o(i)}}_{\text{unobs.}} + \underbrace{\varepsilon_{i,d,t}}_{\text{T1EV}}$$

- **Heterogeneity:** Price and water elasticites vary in pre-intervention density D_d

$$\alpha_d = \alpha_0 + \alpha_1 \log(D_d) \qquad \omega_d = \omega_0 + \omega_1 \log(D_d)$$

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$$\alpha_d = \alpha_0 + \alpha_1 \log(D_d) \qquad\qquad \omega_d = \omega_0 + \omega_1 \log(D_d)$$

- **Caveat:** Currently, crude management of zero-shares (Gandhi et al. 2023).

Model of Residential Choice: Estimation

- **Strategy:** Berry-style inversion and apply instrumental variables GMM.

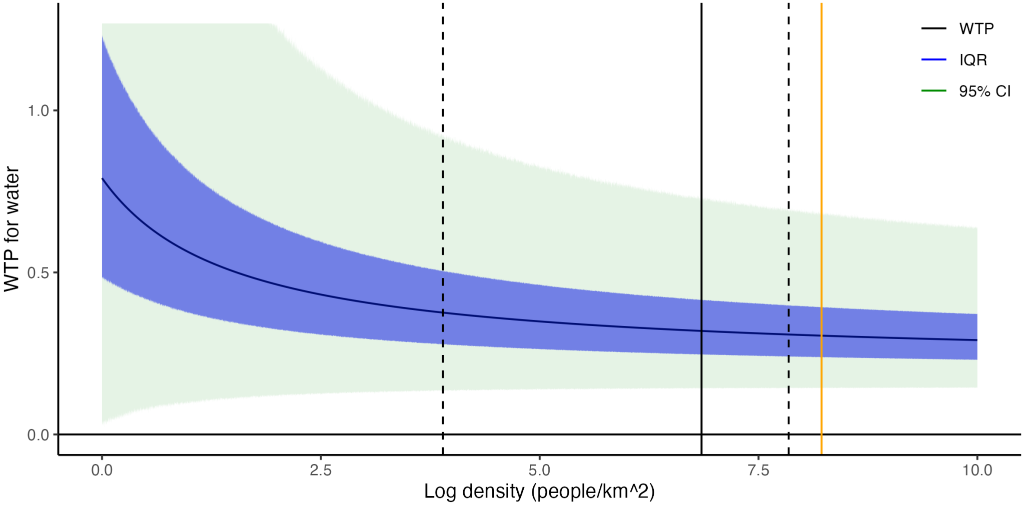
Variable	**Instruments**	**Intuition**
Price: $p_{d,t}$	Death count $\times$ prev.period exposure to elderly F-stat: 42.2	*Supply Shifter*
Water: $W_{d,t}$	Immutable soil chars. $\times$ year F-stat: 204.7	*Exog. Productivity*
Income: $I_{d,t}$	Bartik instrument F-stat: 60.2	*Sectoral wage shifters*

- **Data:** Repeated cross-section of SA2 $\rightarrow$ SA1 migration flows form 2006-2021.

Results: Residential demand estimation

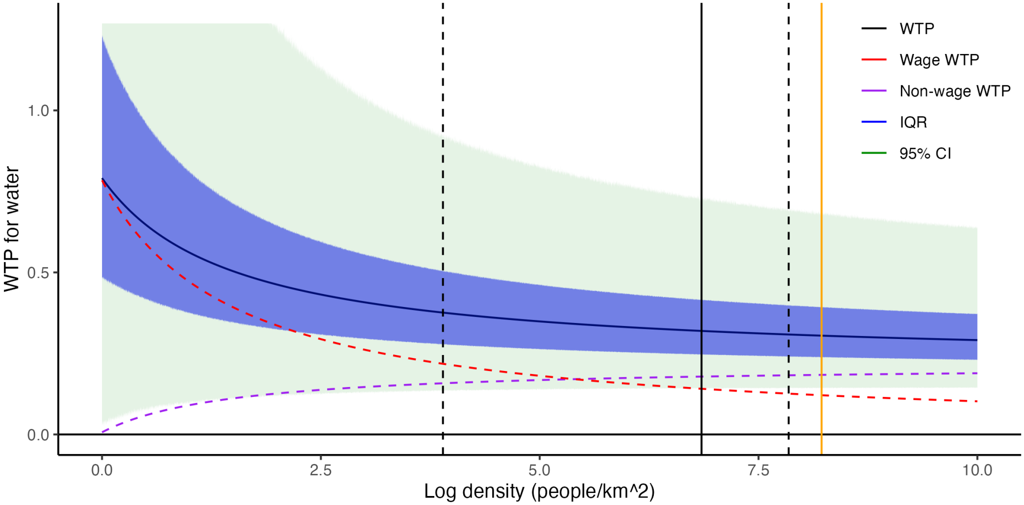
	Main			OLS
Price: α_0	-0.248**	-0.207	-0.224	0.039***
	(0.110)	(0.130)	(0.248)	(0.007)
Price: α_1	-0.165***	-0.218***	0.133	-0.002
	(0.049)	(0.046)	(0.146)	(0.005)
Water: ω_0	0.006	-0.254	-0.360***	-0.362***
	(0.321)	(0.337)	(0.086)	(0.078)
Water: ω_1	0.130***	0.096***	0.022*	0.020*
	(0.020)	(0.021)	(0.012)	(0.011)
Wage: θ	0.691***	0.201***	0.176***	0.129***
	(0.132)	(0.033)	(0.057)	(0.011)
Instr.: Price	✓	✓	✓	
Instr.: Water	✓	✓		
Instr.: Wage	✓			

Local WTP for Water



Note: WTP is utility-equivalent percentage home price decrease per 1 SD water increase. Pecuniary refers to the wage effect. Dashed vertical lines are the 25th and 75th percentile of locations, the black line is the mean, and the orange line is the median resident's location. Inference using Gaussian multiplier bootstrap.

Local WTP for Water



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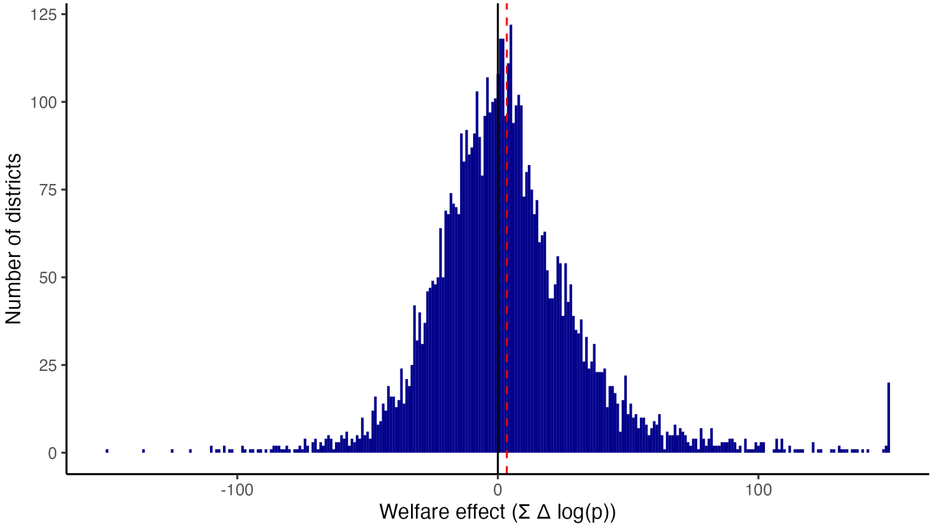
First-order Aggregate Welfare Effect on Communities



Note: A first order approximation for the average welfare effect is equivalent to a 1.1% decrease in home prices per person per year or \$250 million per year. 100 is equivalent to 1,000 households paying 10% less.

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Agricultural WTP for Water

- Need to understand value of productive reallocation.
- **For now:** Estimate simple model using Census of Agriculture from 2005-2020.
- **Production Function:** Cobb-Douglas for crop types $s \in \{\text{annual, dairy, perennial}\}$.

$$\underbrace{Y_{l,t,s}}_{\text{output (\$)}} = \underbrace{\exp(\omega_{l,t,s})}_{\text{productivity}} \underbrace{W_{l,t,s}^{\alpha_W^s}}_{\text{water}} \underbrace{L_{l,t,s}^{\alpha_L^s}}_{\text{labor}}$$

- Can back out marginal WTP from parameters (Rafey 2023).
- **For future:** Serious treatment of functional form, productivity, and inframarginal WTP.

Estimate Agricultural Production

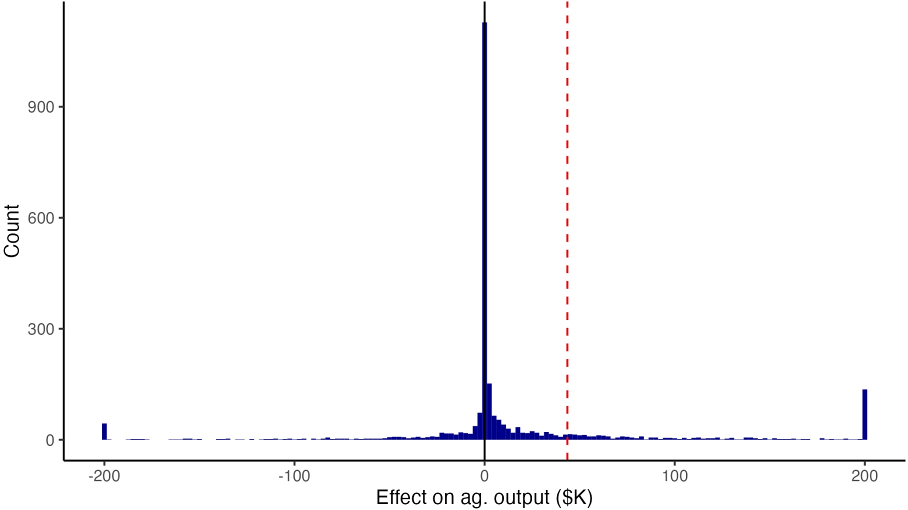
- **Strategy:** Instrument for changes in water and labor from 2005-2020.

$$\underbrace{\Delta \log(Y_{l,s})}_{\text{output (\$)}} = \underbrace{\alpha_W^s \Delta \log(W_{l,s})}_{\text{water}} + \underbrace{\alpha_L^s \Delta \log(L_{l,s})}_{\text{labor}} + \underbrace{\phi_{d(l),s}}_{\text{district fe}} + \varepsilon_{l,s}$$

- **Water instrument:** Rain in SA2.
- **Labor instrument:** 2005 population share in SA2 working in *other* agricultural sectors.

Sector	$\boldsymbol{\alpha_W}$	$\boldsymbol{\alpha_L}$
Annual	0.248***	0.302*
	(0.053)	(0.176)
Dairy	0.359***	0.296***
	(0.100)	(0.108)
Perennial	0.842***	0.377
	(0.122)	(0.264)

Estimated Agricultural Marginal WTP for Water



Note: Using $\frac{\partial Y}{\partial W}$ and the change in evapotranspiration we can do a first order approximation of the realized effect on output–abstracting away from any re-shuffling of other inputs or endogenous productivity growth.

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Framework: Policy? Market Design? Nothing?

- **Efficiency:**
  - Let the market do its thing (Arrow and Debreu 1954, Coase 1960, Stavins 1995).
  - **But**, if private WTP is negatively correlated with community WTP and sufficient heterogeneity, scope for improving efficiency (Slattery 2025, Kline and Moretti 2014).
- **Equity:**
  - Let the market do its thing and redistribute (Atkinson and Stiglitz 1976).
  - **But**, if WTP provides more information about welfare weights or marginal utility of income, distortions may be desired in goods markets (Doligalski et al. 2025).
- **Political Feasibility:**
  - People care about equity.
  - Either don't have tax lever OR indirect redistribution is not salient to impacted parties.
  - Mechanisms that generate **Pareto-improving outcomes** would be ideal.
- **Today:** Explore Pareto gains given joint distribution of private and social WTP.

Correlation between trade, agricultural value, and local WTP

- Predict post-2007 change in water with SA1 farmer WTP and community WTP.

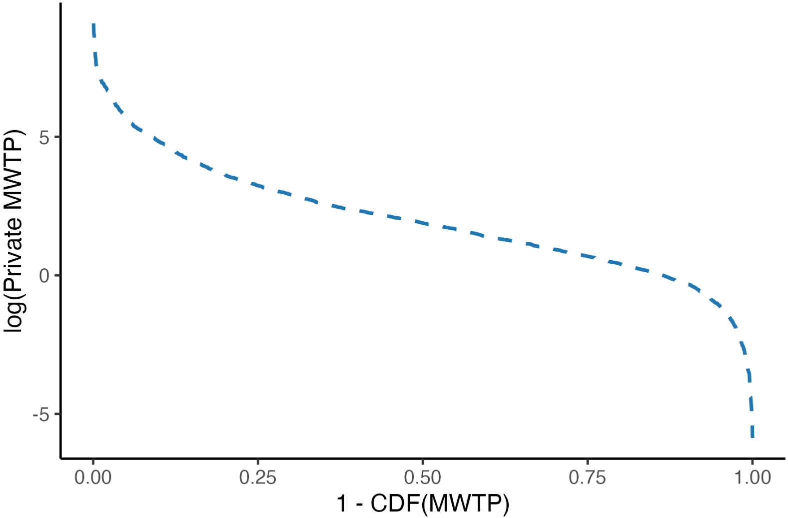
$$\Delta W_l = \underbrace{\beta_F \log(P_l^{MWTP})}_{\text{private wtp}} + \underbrace{\beta_C \log(C_l^{MWTP})}_{\text{local wtp}} + \underbrace{\phi_{d(l)} + \eta_{SA2(l)}}_{\text{regional FEs}} + \varepsilon_l$$

- Private WTP predicts trade while community WTP does not.
- Private and community incentives are negatively correlated.

Dependent Var.:	$\frac{W^{Post}}{W^{Pre}}$ OLS	$W^{Post} - W^{Pre} > 0$ Logit	log(Community WTP)
log(Private WTP)	0.008	0.339	-0.051
	(0.106)	(0.014)	(0.009)
log(Community WTP)	-0.002	-0.263	
	(0.002)	(0.091)	
Observations	2,059	1,552	2,059

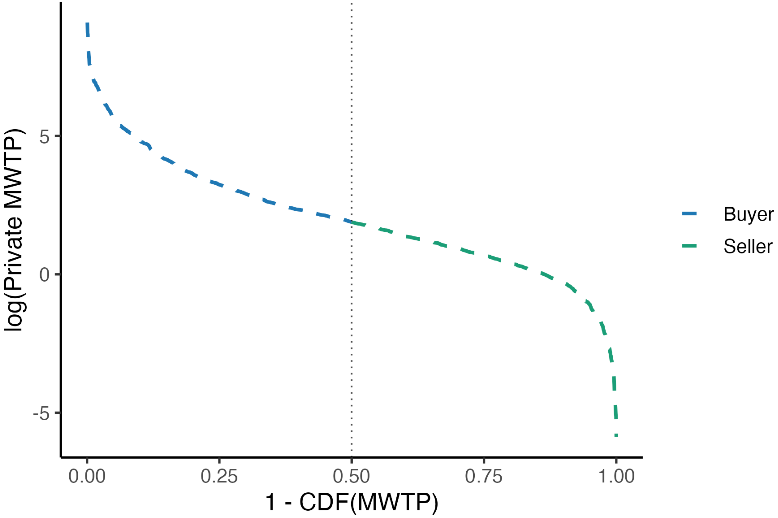
Efficiency and Private Gains

- Distribution of Private MWTP for water



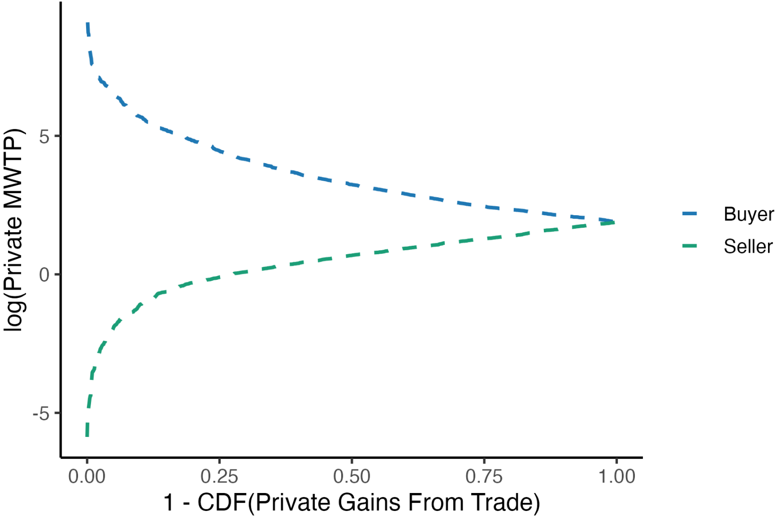
Efficiency and Private Gains

- Distribution of Private MWTP for water
- Identify buyers and sellers



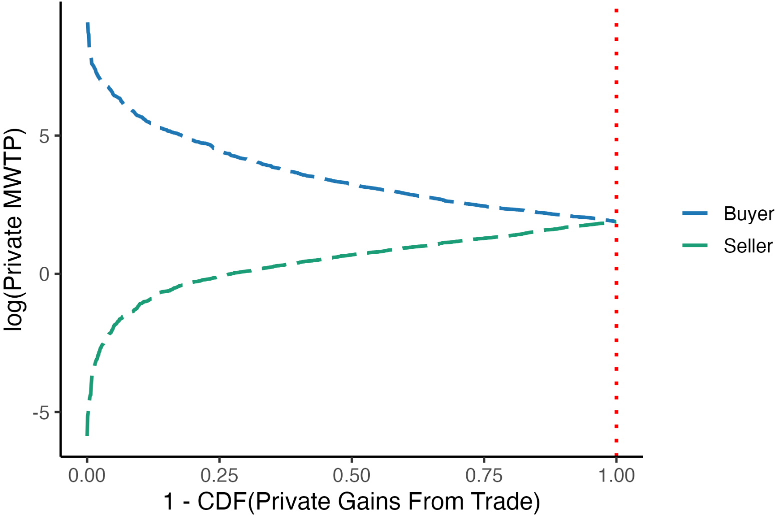
Efficiency and Private Gains

- Distribution of Private MWTP for water
- Identify buyers and sellers
- Order pairs by private gains from trade



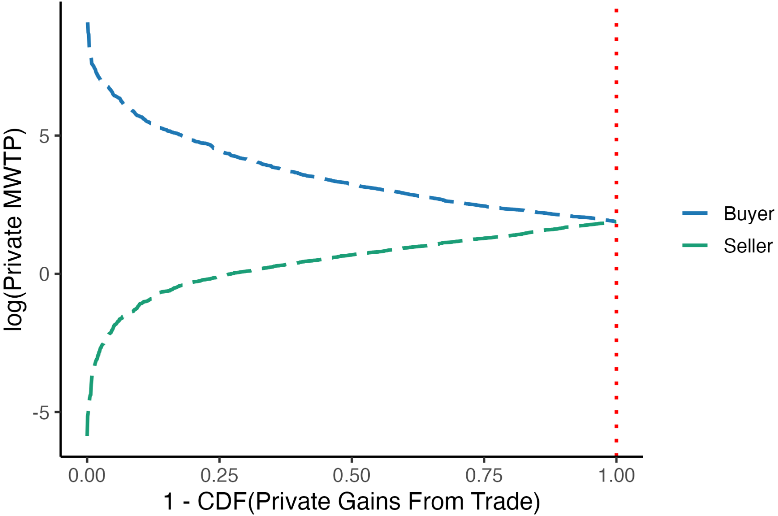
Efficiency and Private Gains

- Distribution of Private MWTP for water
- Identify buyers and sellers
- Order pairs by private gains from trade
- Achieve 100% of private gainful trades



Status quo thinking: Private buyer is reponsible for damages

- Keep this pairing of buyers and sellers

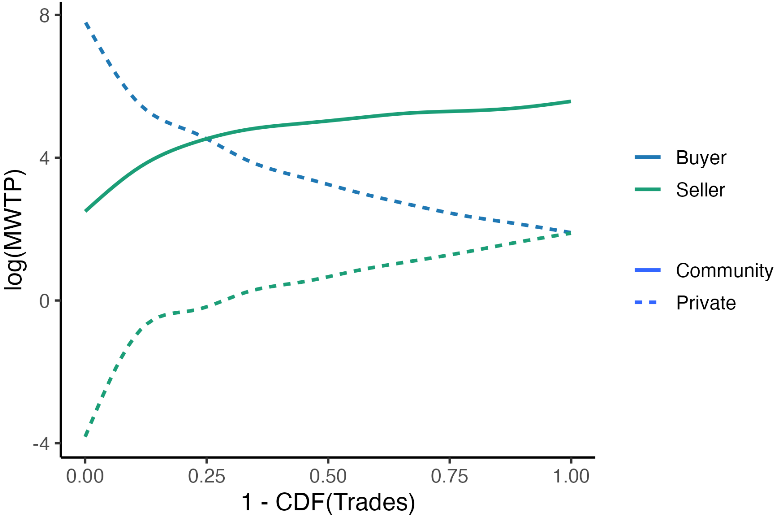


Status quo thinking: Private buyer is reponsible for damages

- Keep this pairing of buyers and sellers

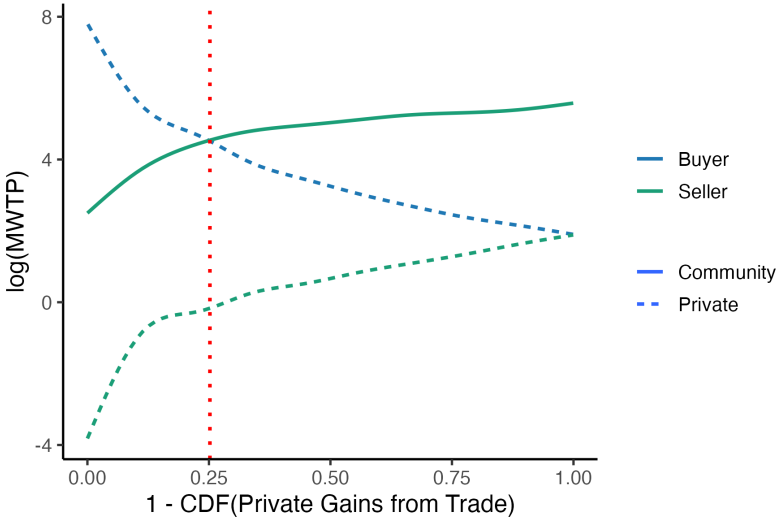
- Incorporate seller community value

- Private buyer responsible for transfer to community



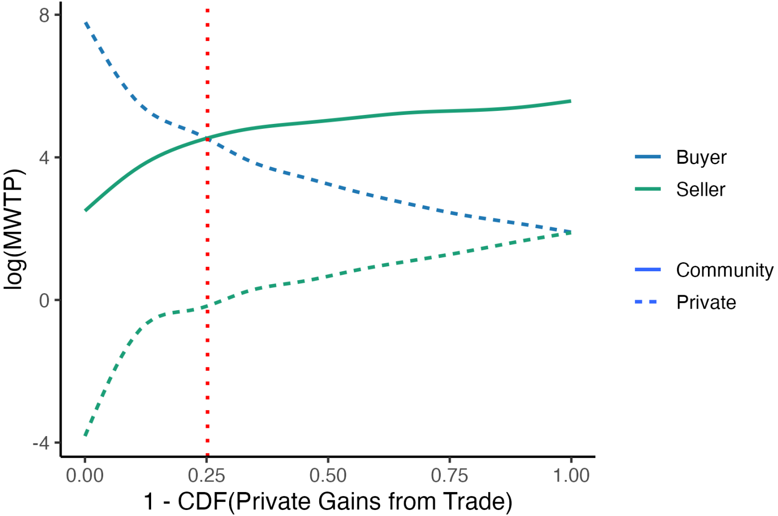
Status quo thinking: Private buyer is reponsible for damages

- Keep this pairing of buyers and sellers
- Incorporate seller community value
- Private buyer responsible for transfer to community
- 25% of gainful trades



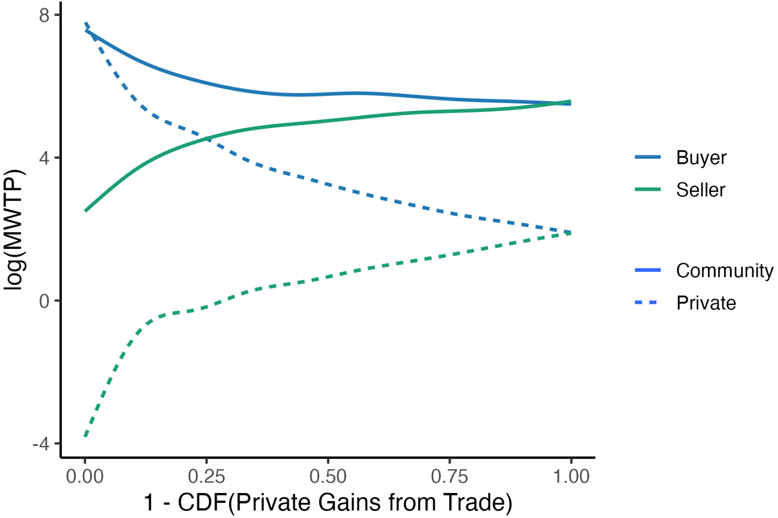
Economist Frustration: Buyer's community benefits not considered

- Myopic consideration of costs/benefits



Economist Frustration: Buyer's community benefits not considered

- Myopic consideration of costs/benefits
- Including buying community shows more gains



Economist Frustration: Buyer's community benefits not considered

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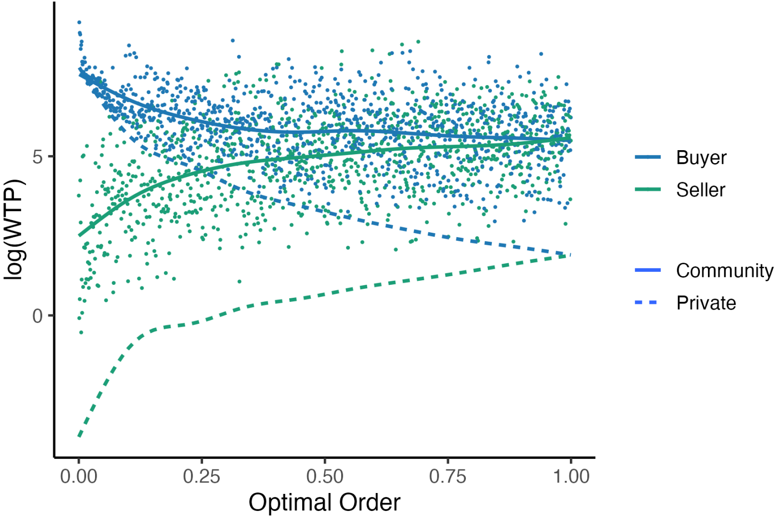
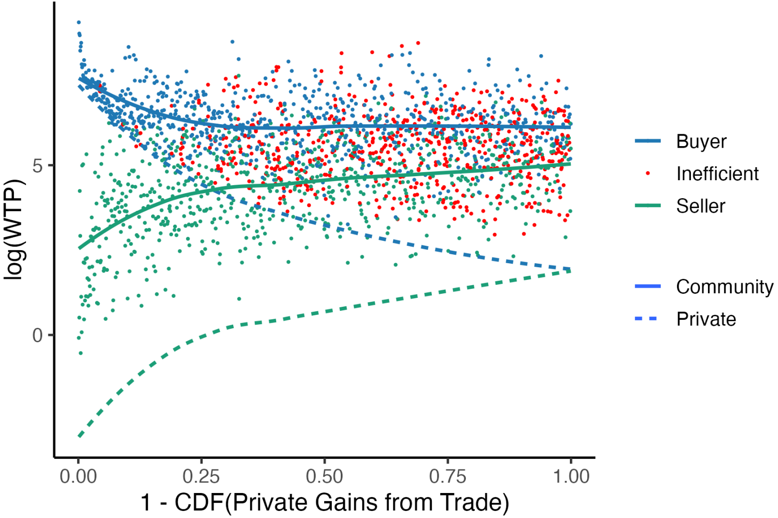


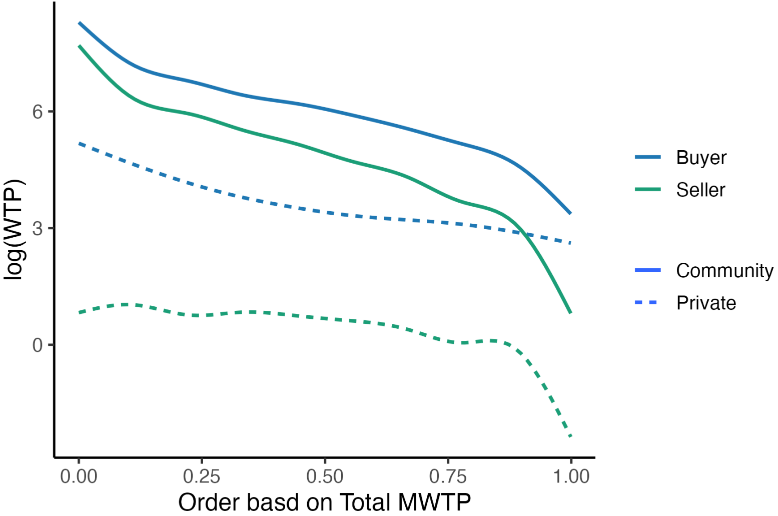
Economist Frustration: Buyer's community benefits not considered

- Myopic consideration of costs/benefits
- Including buying community shows more gains
- Plot masks heterogeneiety
- 38% are myopically inefficient



Economist Frustration: Buyer's community benefits not considered

- Myopic consideration of costs/benefits
- Including buying community shows more gains
- Plot masks heterogeneiety
- 38% are myopically inefficient
- Matching buyers/sellers



Conclusion and Next Steps

- Estimate significant local spillovers from water trade in MDB.

- Average hedonic local WTP for water around 25% of typical market price.

- Achieving widespread Pareto transfers requires incorporation of buying community WTP.

Conclusion and Next Steps

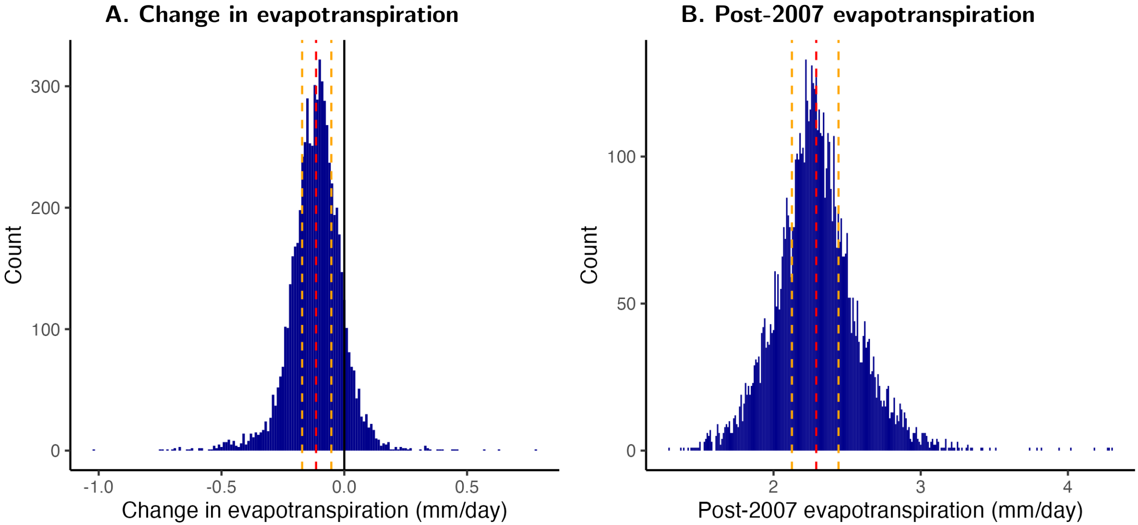
- Estimate significant local spillovers from water trade in MDB.
- Average hedonic local WTP for water around 25% of typical market price.
- Achieving widespread Pareto transfers requires incorporation of buying community WTP.
- **Next Steps:**
  - How do we want to improve production model?
  - How hard should we pursue actual trade data?
  - How GE do we want to be?
  - Where do we want to sit on the efficiency, equity, vs. political design question?

Thanks!

Appendix

Evapotranspiration Distribution

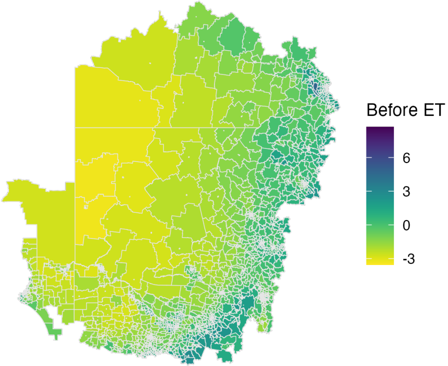
Back



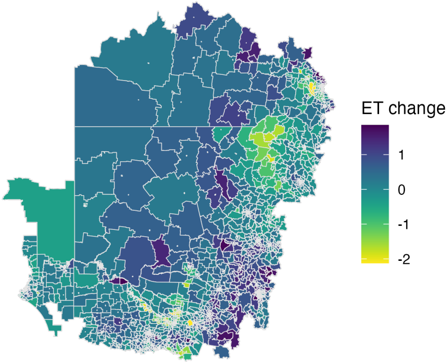
Note: Orange dashed lines are the interquartile range. Red dashed line is the mean.

Evapotranspiration Geography Back

A. Pre-2007 evapotranspiration (mm/day)



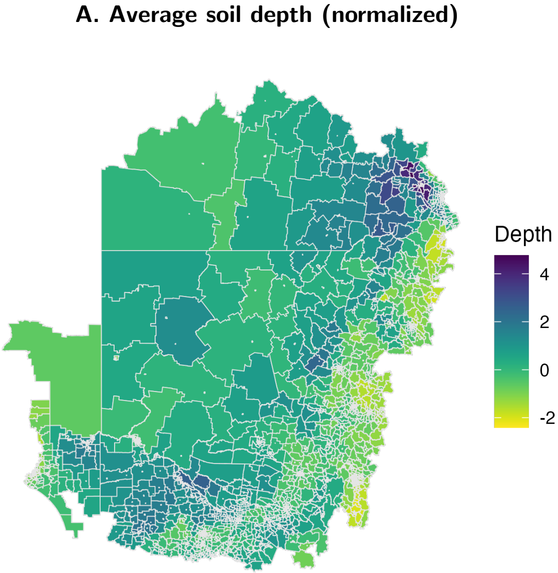
B. Change in evapotranspiration (mm/day)

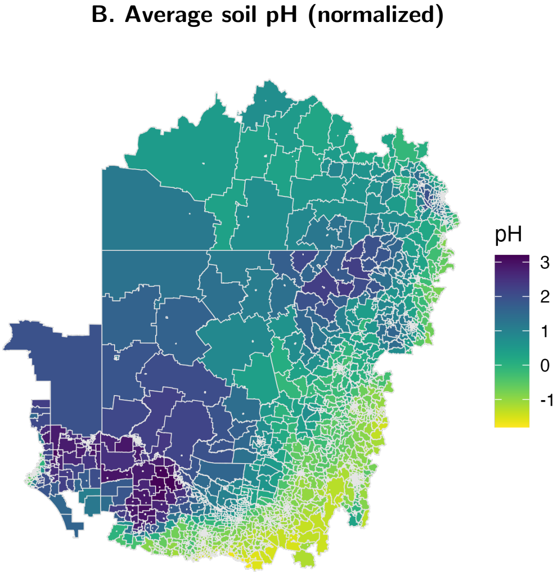


Note: Evapotranspiration data from satellite images. Averages residualize year and month means by SA1.

Soil Characteristic Geography

Back





IV First-Stage Back

Table: First-Stage IV

Dependent Variable:	change_per_land
Model:	(1)
Variables	
pH	-0.0754***
	(0.0238)
pH^2	0.0369***
	(0.0123)
$\sqrt{Depth}$	-0.0408
	(0.0581)
Fixed-effects	
water_id	Yes
Fit statistics	
Observations	6,541
R^2	0.10678
Within R^2	0.01463

Clustered (SA2_CODE21) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table: Income Event-Study Back

Table: Changes in income by change in ET (post 2007)

Dependent Variables:	log(inc_96)	log(inc_01)	log(inc_11)	log(inc_16)	log(inc_21)	pooled
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
change_per_land	-0.0539	0.0095	0.3245***	0.1569**	0.3033***	0.2652***
	(0.0902)	(0.0845)	(0.1068)	(0.0759)	(0.1010)	(0.0504)
Fixed-effects						
water_id	Yes	Yes	Yes	Yes	Yes	
year-water_id						Yes
Fit statistics						
Observations	5,307	5,445	5,020	5,562	5,618	16,200
R^2	0.05006	0.03156	0.07381	0.07625	-0.02261	0.28836
Within R^2	0.01032	0.00317	-0.06126	0.01123	-0.08025	-0.04147
F-test (1st stage)	56.796	56.672	48.586	51.586	49.859	149.00

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table: Rent Event-Study Back

Table: Changes in rent by change in ET (post 2007)

Dependent Variables:	log(rent_96)	log(rent_01)	log(rent_11)	log(rent_16)	log(rent_21)	pooled
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
change_per_land	0.0569	-0.0880	0.1996	0.4270***	0.5076***	0.3982***
	(0.1760)	(0.2187)	(0.1655)	(0.1534)	(0.1944)	(0.0929)
Fixed-effects						
water_id	Yes	Yes	Yes	Yes	Yes	
year-water_id						Yes
Fit statistics						
Observations	5,330	5,426	4,666	5,243	5,542	15,451
R^2	0.15156	0.12373	-0.00623	-0.11257	-0.05145	0.12481
Within R^2	0.00065	-0.01476	-0.01960	-0.14639	-0.13231	-0.09419
F-test (1st stage)	56.982	56.473	47.038	50.746	52.324	149.05

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table: Mortgage Event-Study Back

Table: Changes in mortgage by change in ET (post 2007)

Dependent Variables:	log(mtg_96)	log(mtg_01)	log(mtg_11)	log(mtg_16)	log(mtg_21)	pooled
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
change_per_land	-0.0632	-0.0456	0.2980***	0.3320***	0.6711***	0.4386***
	(0.1500)	(0.1328)	(0.1070)	(0.1091)	(0.1393)	(0.0671)
Fixed-effects						
water_id	Yes	Yes	Yes	Yes	Yes	
year-water_id						Yes
Fit statistics						
Observations	5,284	5,411	4,923	5,434	5,494	15,851
R^2	0.16270	0.14579	0.00727	-0.04168	-0.26304	-0.07315
Within R^2	-0.00418	-0.00248	-0.05021	-0.10969	-0.37058	-0.14816
F-test (1st stage)	56.447	56.655	49.580	49.629	50.236	148.69

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table: Ag Wages Event Study

Back

Table: Changes in Ag. Wages by change in ET (post 2007)

Dependent Variables:	log(ag_income_2011)	log(ag_income_2016)	log(ag_income_2021)	pooled
Model:	(1)	(2)	(3)	(4)
Variables				
change_per_land	0.2262**	0.0384	0.1594*	0.1429**
	(0.0958)	(0.1141)	(0.0932)	(0.0668)
Fixed-effects				
water_id	Yes	Yes	Yes	
water_id-year				Yes
Fit statistics				
Observations	2,573	2,498	2,556	7,627
R^2	-0.01329	0.02253	0.02105	0.15081
Within R^2	-0.02592	0.00056	-0.00193	-0.00516
F-test (1st stage)	70.466	67.116	74.117	211.70

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table: Ag Employment Event Study Back

Table: Changes in Ag. Jobs by change in ET (post 2007)

Dependent Variables:	log(total_ag_jobs)	log(total_ag_jobs)	log(total_ag_jobs)	pooled
Model:	(1)	(2)	(3)	(4)
Variables				
change_per_land	0.4684	0.7622***	0.4868*	0.5695***
	(0.2972)	(0.2914)	(0.2912)	(0.1794)
Fixed-effects				
water_id	Yes	Yes	Yes	
water_id-year				Yes
Fit statistics				
Observations	2,585	2,506	2,561	7,652
R^2	0.02467	-0.03625	-0.00993	-0.00416
Within R^2	-0.03088	-0.07903	-0.03662	-0.04637
F-test (1st stage)	70.429	67.387	74.300	212.10

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table: Political Effects Back

Table: Changes in ALP VoteShare by change in ET (post reform)

Dependent Variables:	log(alp_share_07)	log(alp_share_10)	log(alp_share_13)	log(alp_share_16)	log(alp_share_19)	pooled
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
change_per_land	-0.3490*	-0.1668	-0.4217	-0.6092	-0.7041	-0.4502**
	(0.1943)	(0.2985)	(0.4086)	(0.4176)	(0.4503)	(0.2155)
Fixed-effects						
water_id	Yes	Yes	Yes	Yes	Yes	
year-water_id						Yes
Fit statistics						
Observations	293	293	293	293	293	1,465
R^2	0.17335	0.38238	0.15083	-0.10766	-0.11647	0.16056
Within R^2	-0.50607	-0.10315	-0.32811	-0.72380	-0.73629	-0.44760
F-test (1st stage)	7.3103	7.3103	7.3103	7.3103	7.3103	33.693

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table: Population Event-Study Back

Table: Changes in population by change in ET (post 2007)

Dependent Variables:	log(pop_1991)	log(pop_1996)	log(pop2001)	log(pop_2011)	log(pop_2016)	log(pop_2021)	pooled
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variables							
change_per_land	0.0207	-0.0158	-0.0908	0.2194	0.3115	0.5663**	0.3552***
	(0.1802)	(0.0902)	(0.3168)	(0.2389)	(0.2309)	(0.2241)	(0.1333)
Fixed-effects							
water_id	Yes	Yes	Yes	Yes	Yes	Yes	
year-water_id							Yes
Fit statistics							
Observations	4,289	4,289	4,289	4,289	4,289	4,289	12,867
R^2	0.01929	0.02945	0.05563	0.04838	0.03411	-0.03579	0.07674
Within R^2	-0.00240	0.00315	0.00322	-0.01753	-0.02884	-0.08842	0.01897
F-test (1st stage)	60.753	60.753	60.753	60.753	60.753	60.753	183.01

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

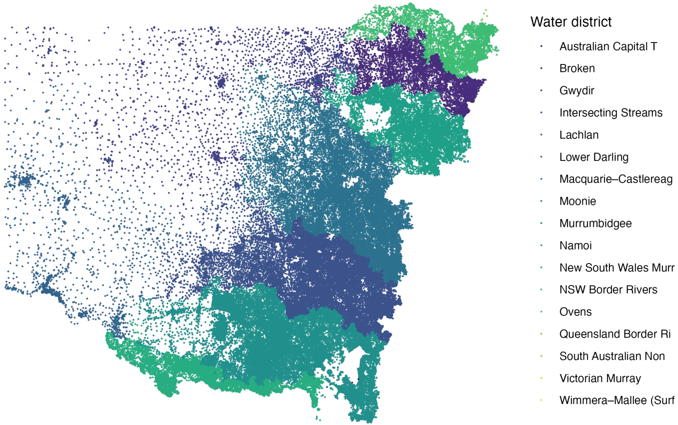
Table: Deaths of Despair Back

Table: Changes in suicide rate by change in ET (post 2007)

Dependent Variables:	asinh(suicide_0812)	asinh(suicide_1014)	asinh(suicide_1115)	asinh(suicide_1418)	pooled
Model:	(1)	(2)	(3)	(4)	(5)
Variables					
change_per_land	-2.927	-4.048	-4.026	-3.656	-3.798*
	(3.205)	(2.734)	(2.696)	(2.276)	(2.190)
Fixed-effects					
water_id	Yes	Yes	Yes	Yes	
year-water_id					Yes
Fit statistics					
Observations	162	196	196	196	750
R^2	-0.08098	-0.33579	-0.30813	-0.14285	-0.23036
Within R^2	-0.30249	-0.65641	-0.62742	-0.55041	-0.56530
F-test (1st stage)	3.1957	6.4595	6.4595	6.4595	19.864

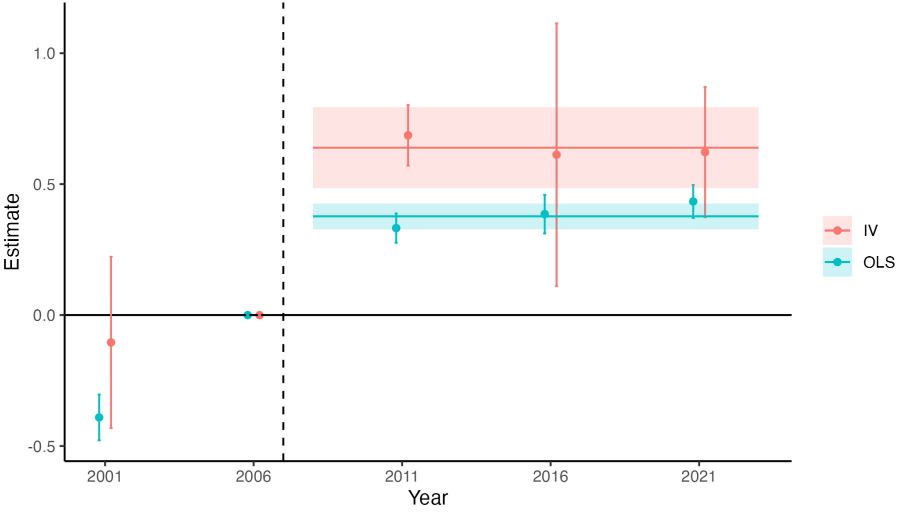
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Resale Data in NSW Back



Notes: 1,290,017 transactions (with price) in MDB portion of New South Wales from 1995-2024. This contains 1/3 of the total population of MDB as of 2006.

Home Prices Event-Study: IV and OLS Figure Back



Notes: Effect of permanent increase in ET/hectare on home resales in NSW.

Table: Home Prices Event-Study

Back

Table: Long run changes in property sale prices

Dependent Variable:	y					
Model:	Pooled IV	Poolied OLS	Placebo 2001	2011	2016	2021
Variables						
change	0.6393***	0.3770***	0.1042	0.6866***	0.6124**	0.6224***
	(0.0787)	(0.0250)	(0.1671)	(0.0589)	(0.2559)	(0.1267)
Fixed-effects						
area_type	Yes	Yes		Yes	Yes	Yes
water_id-year_bunch	Yes	Yes	Yes	Yes	Yes	Yes
property_id	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics						
Observations	310,349	310,349	109,267	164,272	167,050	174,465
R^2	0.83775	0.83840	0.89690	0.87776	0.88207	0.89459
Within R^2	0.00422	0.00819	0.00247	-0.00093	0.00455	0.00654
F-test (1st stage)	7,436.9		1,914.2	4,435.8	2,418.6	3,122.3

Clustered (SA1_CODE21) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*