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How do Restrictions on Foreign Ownership Affect Price: Empirical and Theoretical Analyses of the Saskatchewan Farmland Security Act

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Overview of Poster

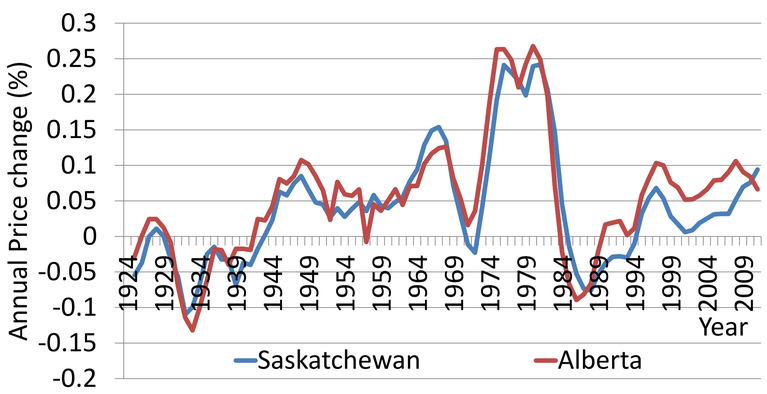
New Theory for Policy: Implications for price changes, such as Dampen and Shift

New Empirics for Policy: Natural Experiment approach, strong evidence for Dampen and weak for Shift

Rock & Hard Place Problem : New discussion of policy options

Motivating Observations

Figure 1: Premise for Data Analysis



Alberta is a good proxy for Saskatchewan.

- **Price changes in AB and SK share common trend**: Shown in Figure 1. *Statistical evidence* in Table 1, strong cointegration from 1921-1977 but weak cointegration from 1921-2011.

- **Policy coincides w. breakdown in historical relation between AB and SK**. Assuming this is due to policy, as in Jared Carlberg (2002) article.

- **Univariate time series with two samples**: New approach for literature. Difference in differences ($\Delta P^{AB} - \Delta P^{SK}$) gives *univariate time series.* Natural experiment (compare *pre-* and *post-policy*), gives *two samples.* *Benefit*: better than AR() models because exploits cointegration. *Drawback*: Testing difference in mean but variance changes (Behrens Fisher problem).

Table 1: Cointegration Results before and after Policy

	1921-1977	1921-2011
β (SK vs AB)	0.82* (0.15)	0.81* (0.12)
δ (Unit root)	-0.15 (0.26)	-0.05* (0.03)

Counterfactual - Price with No Policy

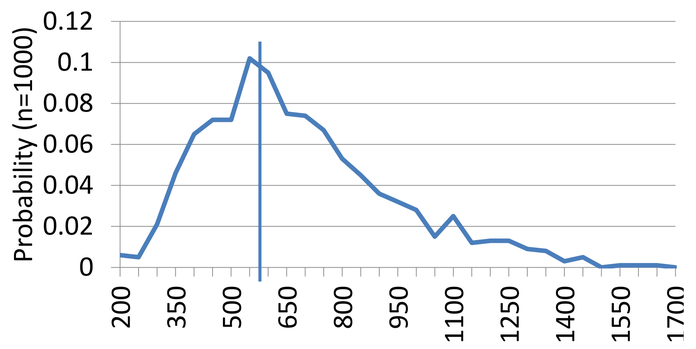
- **Non-parametric method to simulate P^{SK}**: Uses historical distribution of diff-diff and observed AB price changes. New method for literature, based on in changes in cointegration structure.

- **Key calculation:** $\overline{\Delta P_t^{SK}} = \Delta P_t^{AB} + (\overline{\Delta P^{SK} - \Delta P^{AB}})$. Where ΔP^{AB} are *observed* and $(\Delta P^{AB} - \Delta P^{SK})$ are *drawn from distribution pre-policy*.

- **Simulate Price SK 2011 as:** $\overline{P_{2011}^{SK}} = P_{1976}^{SK} \prod_{t=1977}^{2011} (1 + \Delta P_t^{AB} + (\overline{\Delta P^{SK} - \Delta P^{AB}}))$. Gives one point in Figure 2.

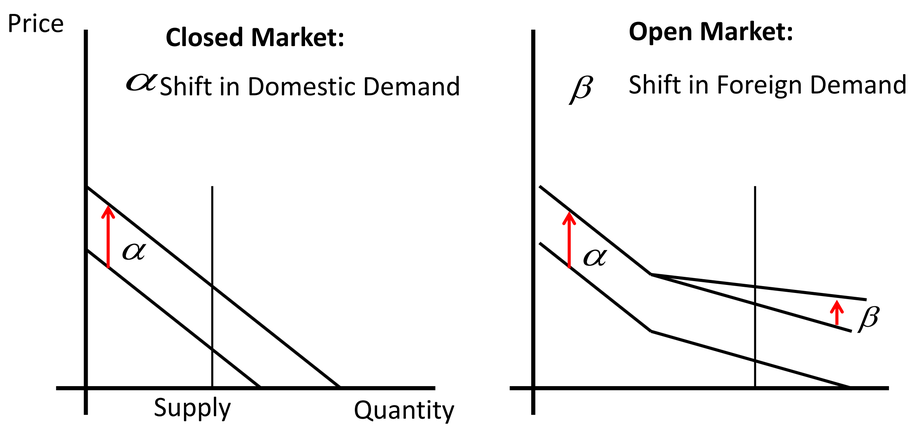
- **Policy decreased Price SK 2011 by 20%:** Economically significant (McCloskey), unlike prior research. However, Figure 2 shows Observed Price is close to *mode* – evidence against mispricing?

Figure 2: Histogram of Simulated Prices



Mean $695, Median $625, Observed $584, Difference 20%

Figure 3: Example where Dampening occurs



Price change larger in open market because two sources of increase in demand (α+β> α).

Theoretical and Empirical Framework

- **Theoretical Approach**: Specify demand function for domestic and foreign buyers, combine, clear.

- **Adding up constraint**: Specifies how to combine demand in open market, new for literature because uses demand rather than inverse-demand function: $Q^T(P) = Q^D(P) + Q^F(P)$.

- **Existence Result:** Policy can decrease absolute value price changes (*Dampening Hypothesis*). Intuition in Figure 3; price increase *smaller in SK* because *no increase* due to foreign demand.

- **Proof of Dampening:** Uses linear demand for domestic and foreign, $Q^i(P) = a^i - b\,P$.

  Technical Result: $\Delta a^F > \Delta a^D > 0 \Leftrightarrow \Delta P^O > \Delta P^C > 0$.
  Means that policy dampens price increases if foreign demand grows faster than domestic.

- **Shift Hypothesis:** Testing if $(\Delta P^{AB} - \Delta P^{SK})$ has larger mean after policy.
- Carlberg's auction theory mechanism: fewer bidders, lower price.

Shift Hypothesis	Raw	MA(1)	MA(2)	MA(3)	MA(4)
Welch t-stat	-0.71	-1.00	-1.15	-1.28	-1.39
Rank-sum test (Normal Approx)	1.32	1.24	1.55	**2.03***	**2.22***

- **Dampen Hypothesis:** Testing if $(|\Delta P^{AB}| - |\Delta P^{SK}|)$ has larger mean after policy than before.
- *(*) significance at 5% level, (**) significance at 1% level.*

Dampen Hypothesis	Raw	MA(1)	MA(2)	MA(3)	MA(4)
Welch t-stat	-1.09	-1.31	**-2.01***	**-2.61****	**-2.98****
Rank-sum test (Normal Approx)	1.13	**1.67***	**1.80***	**2.27***	**2.40****

Weak support for Shift, *agrees with prior research.*

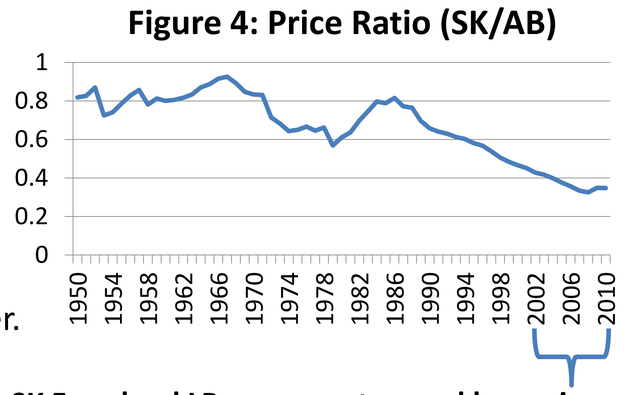
Strong support for Dampen, *extends prior research.*

Concluding Policy Analysis

- **New Welfare Measure:** $W = CS^D + CS^F$.
Net benefit if domestic demand is *larger at all prices*.
Else, policy has net cost for society by W.

- **Thought experiment:** Experience of policymakers in SK.
1977 – domestic demand larger, policy has net benefit, start policy.
30 Years – dampened price increases, foreign demand increases faster.
2007 – foreign demand larger than domestic, policy has net cost!
***Rock and Hard Place Problem**:* net cost yet large foreign demand.

Figure 4: Price Ratio (SK/AB)



SK Farmland LPs appear at record low prices.

Growing Forward

Policy Discussion: Must consider financial investment. *Keep policy:* Low prices create incentive for Farmland LP, such as Assiniboia, Agcapita, Bonnefield, Topsoil (Fig. 4). *Remove:* Normalize prices yet risk large foreign inflows.

Policy Advice: Move to 50% Rule like AB (unlimited ownership for entities with 50%+ Canadian ownership). Will normalize prices (Errunza) yet limit FLP growth.