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Cyclicality of Add-on Pricing

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Prices and Economic Activity at the Aggregate Level

- Is there a trade-off between inflation and unemployment rates?
- There is a weak (at best) relationship between prices and economic activity at the aggregate level

Figure 1. Inflation vs Unemployment in Canada

Inflation vs UR in Canada between 1960 and 2016
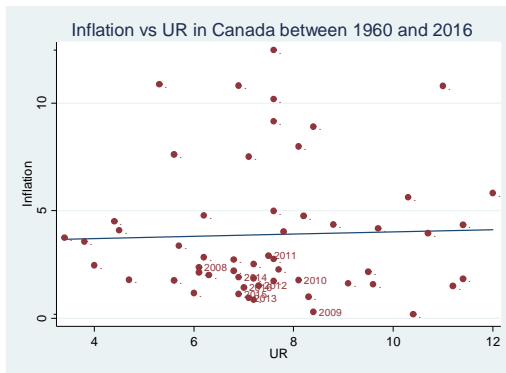
This Paper

- We study the relationship between price dynamics and unemployment rates at the regional level
- We distinguish between base good prices and add-on prices
- The add-on prices display strong procyclicality at the regional level
- In the recessions, the local stores attract the sales of the base good by largely decreasing the price of the extended warranty
- The base good prices do not respond to changes in the regional economic activity
- On aggregate level, both base good measured inflation and warranty adjusted inflation respond to macroeconomic fluctuations
- The response of warranty adjusted inflation is 9 times higher than inflation without the adjustment

This Paper

- A large and growing literature exploiting regional variation to learn about the determinants of aggregate economic variables
- Recent literature focuses on *effective consumer* prices in contrast to posted prices and finds more evidence in favor of price cyclicality
  - Flexibility of prices increases when sales taken into account (Nakamura and Steinsson 2012 and Anderson et al. 2016)
  - Reallocation of expenditure across retailers (Coibon et al. 2015)
  - Cyclicality of add-ons of *retailer's* prices

Overview

- Add-ons' definition and their importance
- Data description
- Empirical analysis of the relationship between price dynamics and unemployment rate at the regional level for base good and add-on
- Evidence using aggregate prices

Add-ons are everywhere

- What is an add-on?
    - Quality improvement
    - "[their] prices are not advertised and would be costly or difficult to learn before one arrives at the point of sale" Ellison (2005)

- Durable goods
    - Cars, home appliances, electronics

- Services
    - Airline tickets, hotel rooms

Importance of Add-ons Increases

- Revenues from baggage fee between 2007 and 2016 in the US increased from 543 M to 4.2 B (Bureau of Transportation Statistics)

Data
Confidential transaction-based dataset

- Canadian nation-wide retailer of durable goods: home appliances, furniture, electronics
- Universe of transaction data between 2000m1 and 2009m12 (more than 6.5 million transactions)
- Transaction-level data allows us to observe all the prices:
  - Base good price
  - **Suggested** extended warranty price
  - **Effective** warranty price
- Warranty prices are usually hidden and they are discretionary

Data
Extended Warranty

- Most goods: option to insure durable beyond manufacturer's warranty
  - manufacturer warranty: 1-2 years
  - extended warranty: 3 years extra years (on average)

- extended warranty makes durable better (vertical quality improvement) and covers
  - parts and labour
  - home visits by service technician
  - replacements costs, when necessary

Data
Extended warranties prices are discretionary

- Salesperson is paid commissions for sales of base goods and extended warranties
- Commission: for extended warranty 15%, for base good 4%
- More discretion over warranty price, less discretion over base good price (competition, price guarantee)
- Effective warranty prices can vary from transaction to transaction

Data
Prices of extended warranties and base good

Table 2. Summary Statistics for Base Good and Add on.

| Base good	Extended Warranty			
Price paid	Take Up	Price paid	Average cost	Price - Cost
610.90	0.37	88.65	23.49	65.16
(1727.80)	(0.48)	(93.40)	(164.34)	(0.12)

Note: Standard errors in parentheses

- Last column tests for difference between mean price and average cost of extended warranty.

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Data
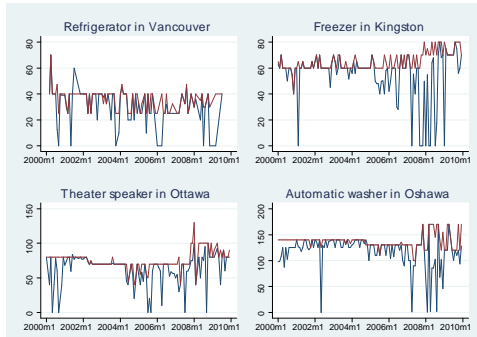Price vs cost for base good and extended warranty

Figure 2. Relationship between prices and costs of base good and extended warranties
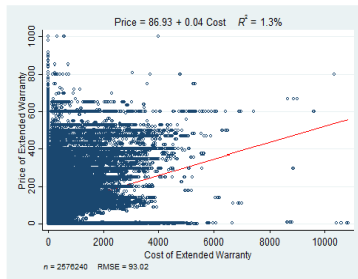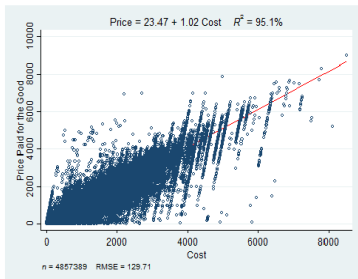
Warranty Prices
Suggested and effective prices over time

Figure 5. Behavior of suggested vs effective warranty prices

- Aggregate the transaction data
  - Median prices for each category and each store every month
  - Independent variable is the difference between suggested and effective warranty price
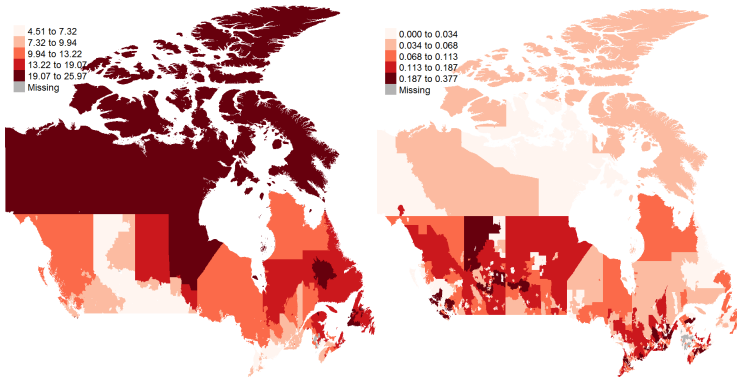
Economic Activity
Unemployment rate across space

- Economic activity is measured as monthly 3 month MA unemployment rate in 60 predefined economic regions
- Each region contains several cities but is smaller than any one province
- Substantial regional differences in industrial activity

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Economic Activity
Unemployment rate and warranty prices across space

Figure 7. Regional unemployment rate and effective warranty prices

Source: Statistics Canada and authors' calculations

Main Specification
Relationship between warranty prices and economic activity

$$p_{tsc} = \beta u_{tr} + \alpha_c + \gamma_t + \delta_r + \varepsilon_{tsc}$$

- p_{tsc}: difference between suggested and effective warranty price for a good belonging to a category c sold at time t in store s
- u_{tr}: unemployment rate at time t in region r
- α_c: category fixed effects
- γ_t: time fixed effects
- δ_r: region fixed effects

## Main Specification
Response is the strongest after one year

Table 3. Relationship between difference in WPs and local UR

| $diffp_{tsc} = \beta u_{tr} + \alpha_c + \gamma_t + \delta_r + \varepsilon_{tsc} + \gamma_t^c * \alpha_c$			
$diffp_{t-1,s,c}$	0.23***	0.23***	0.23***
	(0.01)	(0.01)	(0.01)
u_{tr}	0.88**		
	(0.27)		
$u_{t-6,s}$		0.99**	
		(0.27)	
$u_{t-12,s}$			1.01**
			(0.31)
α_c	$\sqrt{}$	$\sqrt{}$	$\sqrt{}$
γ_t	$\sqrt{}$	$\sqrt{}$	$\sqrt{}$
δ_r	$\sqrt{}$	$\sqrt{}$	$\sqrt{}$
$\gamma_t^c * \alpha_c$	$\sqrt{}$	$\sqrt{}$	$\sqrt{}$
Obs	$482,908$	$482,908$	$482,908$

Main Specification
Visualization of results in time

- Retailer decreases the effective warranty price below the suggested price when the local UR increases

Theater speaker in Ottawa
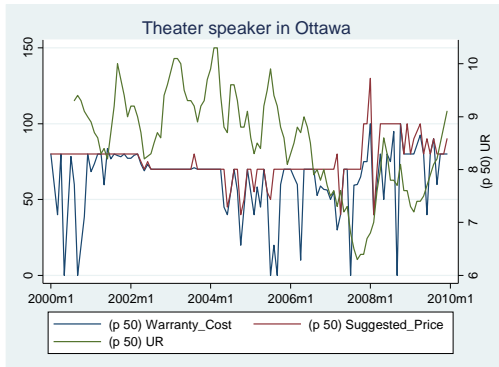
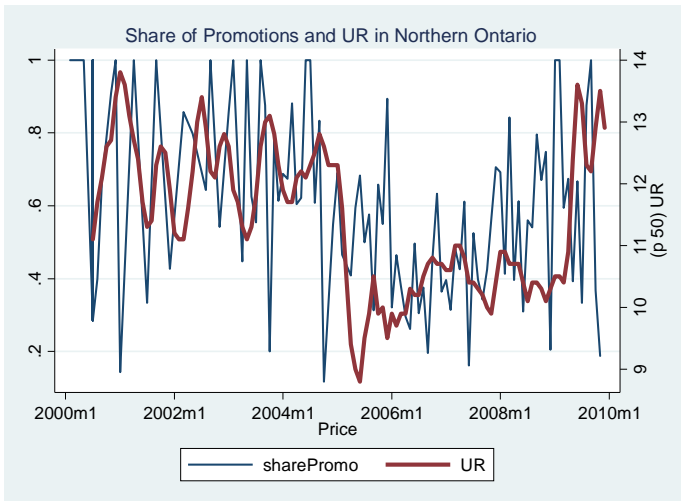## What drives response of extended warranties prices?
Promotions

- Only 2.5 % of the observations are official promotions
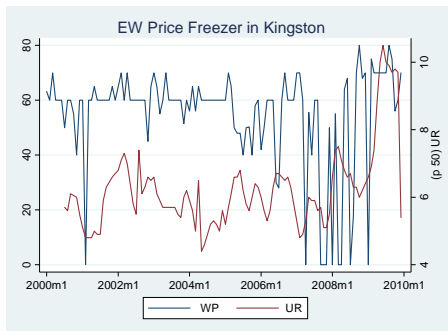
- We classify a sale as an *unofficial* promotion if the effective warranty price < 2 CAD
- 20% of observations qualify as *unofficial* promotions

What drives response of extended warranty prices?
Promotions

Share of Promotions and UR in Northern Ontario

What drives response of extended warranty prices?
Promotions

Table 5. Response of the share of promotions: *pm* to the local UR

$pm_{trc} = \beta u_{tr} + \alpha_c + \gamma_t + \delta_r + \varepsilon_{trc} + \gamma_t^c * \alpha_c$			
$pm_{t-1,r}$	0.02***	0.02***	0.02***
	(0.01)	(0.01)	(0.01)
u_{tr}	0.03		
	(0.02)		
$u_{t-6,s}$		0.09**	
		(0.03)	
$u_{t-12,s}$			0.06**
			(0.02)
α_c	$\checkmark$	$\checkmark$	$\checkmark$
γ_t	$\checkmark$	$\checkmark$	$\checkmark$
δ_r	$\checkmark$	$\checkmark$	$\checkmark$
$\gamma_t^c * \alpha_c$	$\checkmark$	$\checkmark$	$\checkmark$
Obs	201, 526	201, 526	201, 526

Alternative Specifications
Does the base good respond to the local economic activity?

Table 6. Response of wp and base good prices to the local economic activity

	Warranty price		Base good price	
p_{t-1rc}	0.23^{***}	0.23^{***}	0.17^{***}	0.17^{***}
	(0.01)	(0.01)	(0.001)	(0.001)
u_{tr}	-0.91^{**}		0.005	
	(0.27)		(0.01)	
$u_{t-12,r}$		-1.06^{**}		0.006
		(0.31)		(0.01)
α_c	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
γ_t	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
δ_r	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
$\gamma_t^c * \alpha_c$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
Obs	$482,717$	$482,717$	$482,717$	$482,717$

Price Dynamics at Macroeconomic Level
Aggregation

- We create an add-on adjusted price index and a price index without add-ons for our retailer
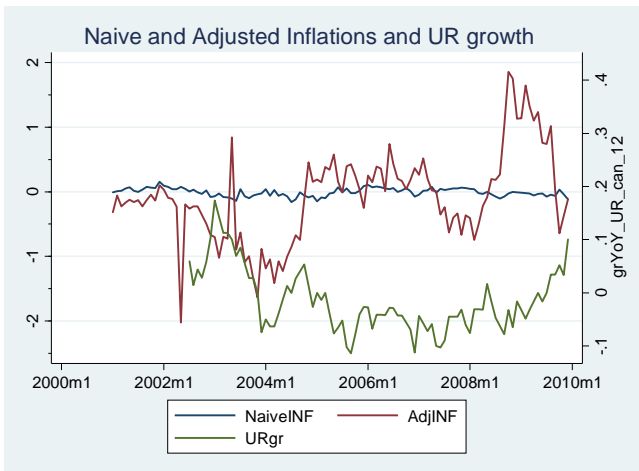
- The price index each month t :

$$P_t = \left(\prod^{N_t} p_{bt}^{I} \left(p_{bt} + p_{wt} \right)^{1-I} \right)^{\frac{1}{N_t}}$$

- When $I = 1$ only base good was purchased

$$\frac{P_t}{P_0}$$

Price Dynamics at Macroeconomic Level
Aggregation

Naive and Adjusted Inflations and UR growth

Price Dynamics at Macroeconomic Level
Aggregation

$\pi_t^i = \alpha + \beta_t \Delta \ln u_t + \varepsilon_t,$		$i = a, n$	
Adjusted inflation		**Naive inflation**	
$\Delta \ln u_{t-6,s}$	$-.05$	$-.06$	
	(0.03)	(07)	
$\Delta \ln u_{t-12,s}$	-3.74^{**}		$-.42^{***}$
	(1.14)		(09)
Obs	189	189	189

Conclusions

- Prices of extended warranties are determined locally and respond to changes in local economic activity
- The local unemployment rate impacts the warranty prices with a lag of one year
- Unofficial promotions whose share increases in recessions seem to (partially) drive the warranty prices' fluctuations
- Base good prices do not respond to the changes of local economic activity but react to aggregate unemployment movements
- The response of aggregate inflation adjusted for warranty prices is 9 times higher than that of standard inflation measure