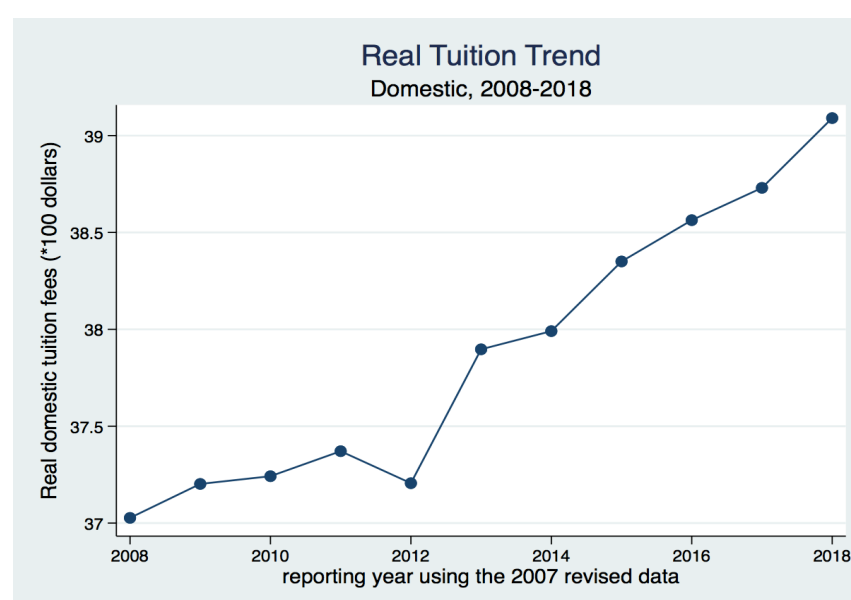
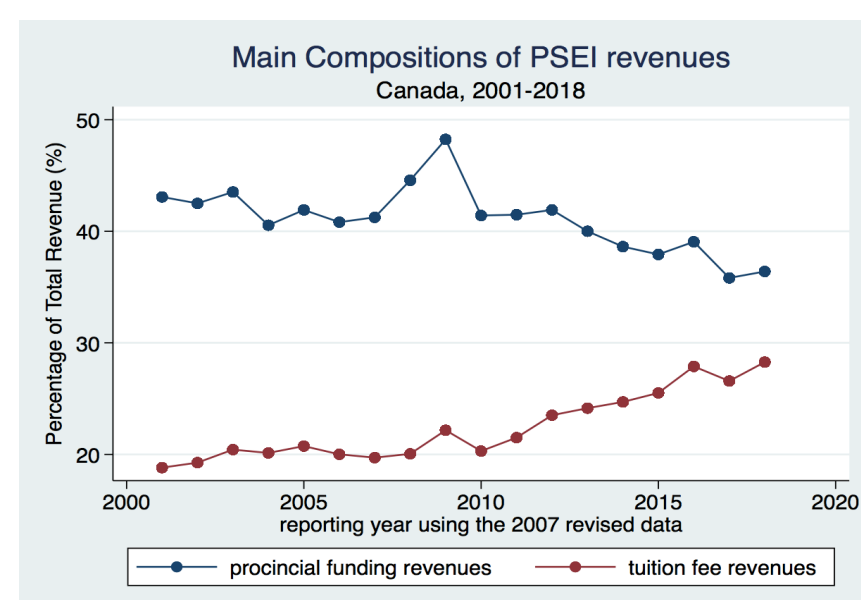
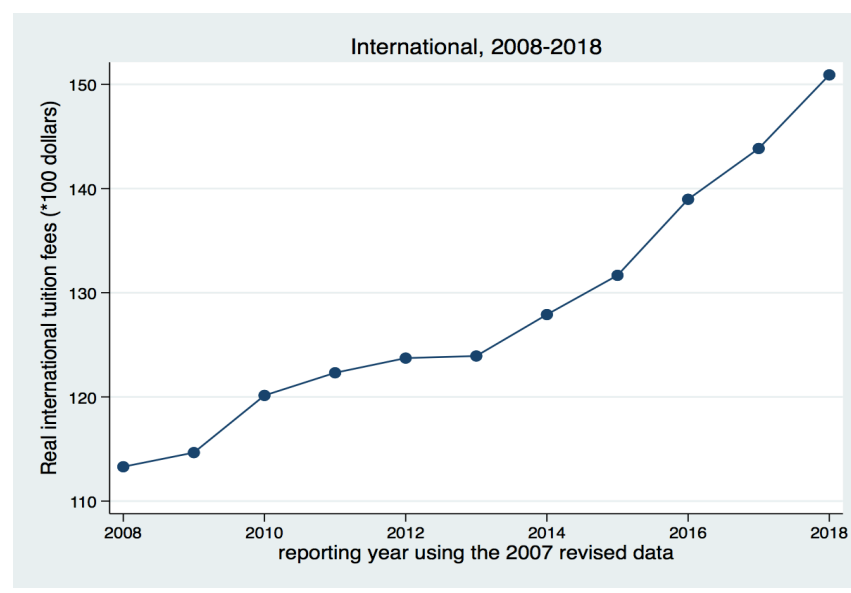
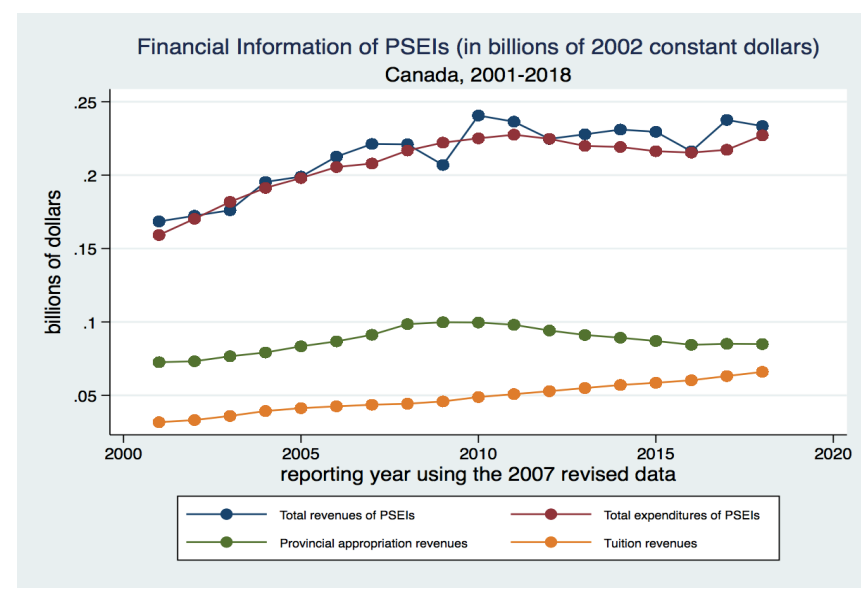


Motivation



- Trend after 2009:**
- Decreasing share of provincial appropriations
 - Declining real government support
 - Increasing share of tuition revenues
 - More real tuition revenues



- Trend of Tuition Fees:**
- Increasing Tuition levels (Domestic & International)
 - More dramatic rise of international tuition levels

Who Pays for Funding Cuts? -- The Effect of Provincial Funding on Tuition Fees

Author: Lindsay Wang Advisor: Nicole Fortin & Marit Rehavi

IV First Stage

Explanatory Variables	(1)	(2)	(3)	(4)	Dependent Variable: ln (deflated institutional appropriations)
	All PSEIs	Flagship	Research	Non-Research	
Left	0.221*** (0.0330)	0.283*** (0.0614)	0.182*** (0.0326)	0.215 (0.143)	Left wing parties favor public spending increases. • Larger impact on the real appropriation incomes.
Right	0.0957*** (0.0286)	0.187*** (0.0610)	0.0452* (0.0268)	0.172** (0.0918)	
F (2, df)	36.76	15.80	39.78	1.84	
SW F (1, df)	16.79	6.93	7.27	3.53	

Explanatory Variables	(1)	(2)	(3)	(4)	Dependent Variable: Domestic Tuition Freeze Policy
	All PSEIs	Flagship	Research	Non-Research	
Left	0.359*** (0.0823)	0.532*** (0.106)	0.386*** (0.103)	0.462* (0.238)	Left wing parties are more likely to take action to regulate the PSE market.
Right	-0.186** (0.0765)	0.0744 (0.117)	-0.174* (0.0932)	-0.0435 (0.180)	
F (2, df)	114.36	24.42	72.17	6.00	
SW F (1, df)	16.79	6.97	7.26	8.34	
Observations	1059	256	667	136	
df	953	216	592	97	

- Selection of Instruments:**
- Significant
 - Strong ($F > 10$)
 - Just-identified

Definition

- Public Post-Secondary Education Institutions (PSEIs):
 - Universities or colleges funded by the different levels of governments: provincial, federal.
- Main Sources of PSEI Incomes:
 - Provincial grants > Tuition revenue > Donations
- Classification of Instructional Programs for Full-time Students at Canadian Degree-granting Institutions (CIP)
- Research Intensity \approx Resource Intensity
 - Indicated by research income of PSEIs; Used as criteria of categorization.
 - More resource-intensive means more capable to attract both kinds of students.
- Lagged Total Expense:
 - Total expenses of institutions of the previous year will affect the tuition levels in the current year.
- Tuition Freeze Policy:
 - Provincial government decide to freeze domestic tuition for a period of time.
 - Adopted as a dummy indicating overall government regulation of the higher education market.
- Political ideology:
 - Left wing, Center, Right wing, which is in power of the provincial government.
 - Work as instruments.

Data

Source	Description	Level	Units
Tuition and Living Accommodation Costs (TLAC)	Upper and Lower Tuition levels of Domestic and International students for PSEIs across disciplines	Institutional	Current dollars
Financial Information of Universities and Colleges Survey (FIUC)	Financial reports of the PSEIs, mainly Income (Appropriation income, research income) and Expenses	Institutional	Current dollars (*1000 dollars)
Statistics Canada	Income per capita	Provincial	2002 constant dollar
	Unemployment rate		Percentage
	Linked CPI for education products		2002 = 100
	Population at age 18-24		* 100,000 persons
	Study permit holders attending PSEIs		* 10,000 persons
Manually Collected	Total enrollment (domestic/international)	Provincial	* 10,000 persons
	Domestic Tuition Freeze Policy		Dummy
	Ideologies of parties in power		Dummy

Time Frame: 2000 - 2018.

Note: In 2007, CIP was adopted, and the data universe expanded from 60 to 102 PSEIs

Summary Statistics

Variable	N	Mean	Std.Dev.	Min	Max
ln (deflated average domestic tuition)	1221	3.605	.26	2.751	4.707
ln (deflated average foreign tuition)	1210	4.579	.277	3.46	5.5
ln (deflated institutional level appropriations)	1313	6.212	1.579	-.968	9.118
Flagship					
ln (deflated average domestic tuition)	288	3.596	.238	2.751	4.046
ln (deflated average foreign tuition)	288	4.746	.229	4.019	5.5
ln (deflated institutional level appropriations)	304	7.988	.454	6.866	9.118
Research					
ln (deflated average domestic tuition)	767	3.573	.242	2.751	4.277
ln (deflated average foreign tuition)	760	4.565	.236	3.604	5.272
ln (deflated institutional level appropriations)	818	6.177	.843	4.184	7.981
Non-research					
ln (deflated average domestic tuition)	166	3.766	.315	3.22	4.707
ln (deflated average foreign tuition)	162	4.347	.342	3.46	5.221
ln (deflated institutional level appropriations)	191	3.536	1.257	-.968	5.085

Categorization is based on the research intensity of PSEIs.
 • Helps to reduce the heterogeneity of institutions.
 • Smaller standard deviations within groups in general.

Universities as a member of the U15 Group of Canadian Research Universities are defined as the Flagship universities.
 Institutions has average research income less than 1000 Canadian dollars are categorized as Non-research PSEIs.
 The ones left automatically fall into the category of Research PSEIs.

Robustness Check

Results are robust when:

- Clustering on the other levels
 - dividing provinces into regions by economic volumes
- Using the 2007 unrevised tuition data
- Adding the long list of provincial level controls, such as:
 - More controls on the provincial level
 - i.e. the Gini coefficient, the provincial level of per capita GDP, the total tax revenues of the provincial government, the share of population below the poverty line.

Theory

Resource dependence theory (RDT)

Reliance on a resource provided by an external party would put institutions under the possible control of the provider, depending on the importance of the resource.

Common Resolution: Resource diversification (e.g., seeking alternative revenues)

PSEIs will diversify risks of less proportion of provincial funding income by seeking other types of revenues via two ways:

- enrolling more students who are paying higher tuition fees
- raising tuition at all levels

Due to the lack of enrollment data:

>> **QUESTION:** What's the marginal effect of the decreasing provincial government funding to Canadian public PSEIs on their domestic and international tuition levels?

Classical Partisan Theory

Left-wing parties: promote community participation and favor public spending increases.

Right-wing parties: rely more on market mechanisms and aim at education privatization and budget reductions.

Methodology

OLS MODEL: $\ln(tuition_{i,t+1}) = \beta_0 + \beta_1 \ln(app_{i,t}) + \beta_2 Domtuifrz_{i,t} + W_{p,t}\theta + X_{i,t}\lambda + \gamma_t + \delta_i + \epsilon_{i,t}$

$W_{p,t}$: matrix of provincial-level time varying controls.

$X_{i,t}$: matrix of institutional-level time varying controls.

γ_t and δ_i are year- and institutional fixed effects.

IV METHOD (2SLS)

First Stage:

$\ln(app_{i,t}) = \alpha_0 + \alpha_1 Left_{p,t} + \alpha_2 Right_{p,t} + W_{p,t}\theta_1 + X_{i,t}\lambda_1 + \gamma_{1t} + \delta_1 + \epsilon_{1,t}$
 $Domtuifrz_{i,t} = \alpha_0 + \alpha_1 Left_{p,t} + \alpha_2 Right_{p,t} + W_{p,t}\theta_2 + X_{i,t}\lambda_2 + \gamma_{2t} + \delta_2 + \epsilon_{2,t}$

Second stage:

$\ln(tuition_{i,t+1}) = \beta_0 + \beta_1 \ln(app_{i,t}) + \beta_2 Domtuifrz_{i,t} + W_{p,t}\theta + X_{i,t}\lambda + \gamma_t + \delta_i + \epsilon_{i,t}$

- Instrument: Ideologies of the party in power (Left, Right, Center)

IV Results

PANEL A: Dependent variable: ln (deflated average domestic tuition)

Explanatory Variables	(1)	(2)	(3)	(4)
	All PSEIs	Flagship	Research	Non-Research
ln (deflated institutional level appropriations)	-0.252	-0.424	-0.190	-0.093
domestic tuition freeze policy	(0.083) *** {0.105} ** {0.131} **	(0.152) *** {0.072} *** {0.072} ***	(0.106)* {0.141} {0.160} *	(0.227) {0.124} {0.137}
Time Fixed Effects	Yes	Yes	Yes	Yes
Institutional Fixed Effects	Yes	Yes	Yes	Yes
constant	3.514*** (1.302)	6.517*** (2.374)	-0.005 (1.653)	9.666 (8.497)
Number of PSEIs	1059	256	667	136
R-squared	0.935	0.926	0.940	0.959

Standard errors in parenthesis are robust.
 Standard errors in square brackets are clustered at the institutional level.
 Standard errors in braces are clustered at the provincial level.

- When the provincial government disinvest by 10% in real term, the domestic students pay 2.52% more tuition fees in general.
- More research-intensive institutions respond by more.

- No significant relationship found between the tuition freeze policy and domestic tuition level.
- Close to a precise zero which is in line with the effect of domestic tuition freeze on the percentage change of real domestic tuition levels.

- Robustness tested at different levels.

Key Findings

A 10% cut of real appropriations granted to an institution leads to the domestic tuition levels to **rise** by 2.52% at all PSEIs, and by approximately 4.24% at the most selective Flagship universities.

A 10 % shrink in real funding brings about a 1.83% **decrease** in international students' tuition fees and a 3.52% reduction in Flagship universities' international tuitions.

TYPES of STUDENTS

Institutions have more market power with domestic students.

A real appropriation shock leads an institution to raise real domestic tuition fees, but lower real international tuition levels.

INDEED, it is the **DOMESTIC** students that pay for the funding cuts.

TIERS of PSEIS

More resource/research-intensive = Larger pool of both type of students= More elastic to funding cuts.

More capable of raising domestic tuition levels and lowering the international tuitions by more.

(The tuition revenue earned from one more international student >> The loss of lowering per student tuition)

GOVERNMENT INTERVENTION

Effectively regulates both the domestic and international tuition levels.

IV Results

PANEL B: Dependent variable: ln (deflated average international tuition)

Explanatory Variables	(1)	(2)	(3)	(4)
	All PSEIs	Flagship	Research	Non-Research
ln (deflated institutional level appropriations)	0.183	0.352	0.242	0.232
domestic tuition freeze policy	(0.088) ** {0.094} * {0.061} ***	(0.175) ** {0.168} ** {0.174} **	(0.162) {0.181} {0.134} *	(0.197) {0.206} {0.262}
Time Fixed Effect	Yes	Yes	Yes	Yes
Institutional Fixed Effect	Yes	Yes	Yes	Yes
constant	3.797* (2.012)	12.864*** (2.143)	-6.075** (2.479)	0.296 (9.166)
Number of PSEIs	1051	256	662	133
R-squared	0.869	0.825	0.858	0.908

Standard errors in parenthesis are robust.
 Standard errors in square brackets are clustered at the institutional level.
 Standard errors in braces are clustered at the provincial level.

- A 10 percent shrink in real funding brings about a 1.83% decrease in international students' tuition fees and a 3.52% reduction in Flagship universities' international tuitions.
- More research-intensive institutions respond by more.

- The domestic tuition freeze policy (more generally, government intervention) leads to negative percentage change in real foreign tuition levels in all PSEIs and research institutions.
- In general, government regulation effectively regulates the international tuition levels.

- Robustness tested at different levels.

Future Paths

- Explore how PSEIs will respond to a real funding cut across disciplines
- Are tuitions of majors with **possible higher returns** after graduation more elastic than the ones that are potentially less beneficial?
 - Median wages of employed workers
 - Length of job searching period

- Each discipline has a lower and upper bound of tuition level
- Do they respond to the same extent, or do they differ?

- Different types of tuition policies
 - Tuition Freeze; Tuition caps; Limited tuition increase rate
- Which one is more effective at regulating the tuition levels?

Contribution

- Focus on the institutional level data, rather than provincial level
- Look into the Policy Effects of the provincial tuition freeze
- Adopt Political ideologies as instruments
- Canadian Context
 - Enrollment scheme: domestic and international
 - Tuition levels dependent on the 2 types of students (expect Quebec, and Nova Scotia)
 - Categorization by the institutions' research-intensities
- Tuition level: Weighted average of Upper and Lower tuition fees across disciplines, and then weighted again by the number of disciplines.