

# Do Urban Casinos Affect Nearby Neighborhoods? Evidence from Canada

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- Composition of resident population
  - Effects strong enough to alter neighborhood characteristics?

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- About 40 casinos opened 1986-2007



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- Unemployment rate, household income

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Use interpolated time series from the every-5 year censuses

## Casinos in sample - part 1

Name of establishment	City	Year Opened
Casino Edmonton	Edmonton	1986
Treasure Cove Casino & Hotel	Prince George	1986
Stampede Casino	Calgary	1988
Elbow River Casino	Calgary	1989
Palace Casino	Edmonton	1990
Assiniboia Downs Club West Gaming Lounge	Winnipeg	1992
Lake City Casino	Kelowna	1992
Lake City Casino	Kamloops	1992
Casino Lethbridge	Lethbridge	1993
Casino de Montral	Montral	1993
Club Regent Casino	Winnipeg	1993
McPhillips Street Station Casino	Winnipeg	1993
Casino Windsor	Windsor	1994
Cash Casino	Red Deer	1995
Casino Nova Scotia	Halifax	1995
Baccarat Casino	Edmonton	1996
Casino Regina	Regina	1996
Casino du Lac-Leamy	Gatineau	1996
Frank Sisson's Silver Dollar Casino	Calgary	1996
Northlands Park	Edmonton	1996



## Casinos in sample - part 2

Name of establishment	City	Year Opened
Casino Calgary	Calgary	1997
Jackpot Casino	Red Deer	1997
Rocky Mountain Turf Club	Lethbridge	1997
Great Canadian Casino Nanaimo	Nanaimo	1998
Windsor Raceway	Windsor	1998
Brantford Charity Casino	Brantford	1999
Casino Sault St. Marie	Sault St. Marie	1999
Fort Erie Racetrack	Fort Erie	1999
Gateway Casino Burnaby	Burnaby	1999
Sudbury Downs	Chelmsford	1999
Western Fair Raceway	London	1999
Casino Yellowhead	Edmonton	2000
Point Edward Charity Casino	Point Edward	2000
Thunder Bay Charity Casino	Thunder Bay	2000
Woodbine Racetrack	Toronto	2000
Boulevard Casino	Coquitlam	2001
Great Canadian Casino View Royal	Victoria	2001
Fraser Downs Racetrack Casino	Surrey	2004
Niagara Fallsview Casino Resort	Niagara Falls	2004
River Rock Casino Resort	Richmond	2004

## Casinos in sample - part 3

Name of establishment	City	Year Opened
Edgewater Casino	Vancouver	2005
Century Casino & Hotel	Edmonton	2006
Dakota Dunes Casino	near Saskatoon	2007
Hastings Park Racecourse	Vancouver	2007
Ludoplex Trois Rivieres	Trois-Rivieres	2007
Salon de Jeux de Quebec	Quebec	2007
Starlight Casino	New Westminster	2007

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Starlight Casino	New Westminster	2007

### Notes

- Not all casinos will be included for all analysis
- Economic and housing variables not available after 2006 census
- ... 37 casinos for those outcome variables

## Outcome Variables: $\Delta Y$ or $\% \Delta Y$ 5 Years Since Opening

For  $Y$  define as shares (e.g., owner-occupied housing)

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where  $t$ : opening year

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where  $t$ : opening year

We use 4-year changes for casinos opened in 2007

## A Quick Glance: Growth Differentials

Divide a city using a 2-miles circle from a new casino

- the part *within*
- the part *outside*



## A Quick Glance: Growth Differentials

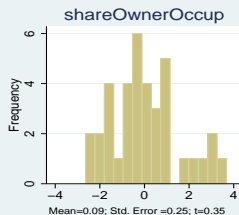
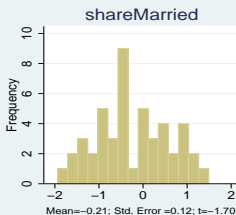
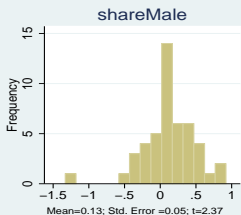
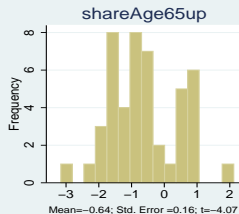
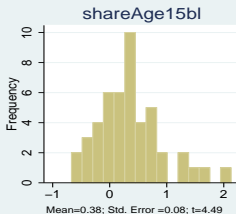
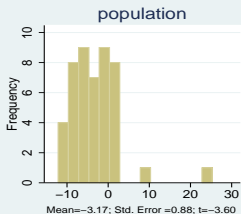
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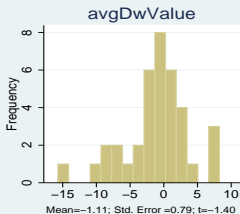
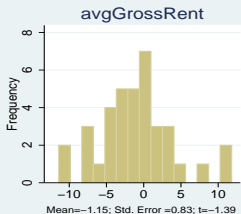
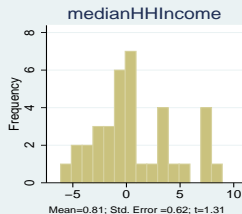
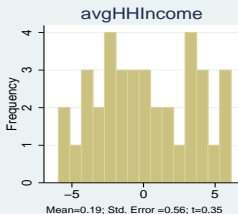
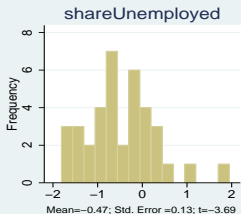
Calculate *Growth differentials*

- = growth within - growth outside

# Histograms of Growth Differentials



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## correlation is not causation

Casino locations are not random

- tend to be in areas with a smaller resident population, lower income and home values, higher unemployment, more renters and less married couples

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Initial conditions may correlate with later growth

- *e.g.*, US subprime boom affected poorer neighborhoods more heavily

## Using Neighborhood-level Data

To estimate centre effects

- potentially stronger than average effects within a 2-mile circle

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To select and compare only neighborhoods with similar initial characteristics

- using a Propensity Score Matching (PSM) algorithm

## Use Census Tracts to Define Neighborhoods

Statistics Canada Census Dictionary:

*Area that is small and relatively stable, [usually having] a population between 2,500 and 8,000 persons*



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Possible to make comparisons over time

- If there are splits, we combine splits for comparison with “parents”

## Initial conditions - Full sample

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min.</b>	<b>Max.</b>	<b>N</b>
Total population	19622.18	23732.06	53	144810.2	4547
Share - Age below 15	18.66	5.38	0.07	38.69	4547
Share - Age 65 and over	11.84	5.74	0	62.53	4547
Share - Male	48.89	1.95	36.29	72.34	4547
Share - Married	54.03	10.34	10.4	84.04	4547
Unemployment rate	7.51	3.25	0	56.67	4547
Share - Owner occupied	65.17	20.69	0.34	98.79	4547
Average household income	62136.67	25064	13146	457524	4547
Median household income	51852.02	16786.06	9698.6	174947.4	4547
Average gross rent	771.93	222.15	113	2354.2	4547
Average dwelling value	261143.45	180535.29	25702.4	1667072	4547

## Initial conditions - Census tracts within 2 miles

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min.</b>	<b>Max.</b>	<b>N</b>
Total population	9070.69	10047.52	53	45044	488
Share - Age below 15	15.91	6.12	1.17	37	488
Share - Age 65 and over	13.84	6.52	0	57.04	488
Share - Male	49.04	2.73	37.01	72.34	488
Share - Married	45.14	12.16	11.49	69.61	488
Unemployment rate	9.44	4.25	0	56.67	488
Share - Owner occupied	49.77	22.24	0.93	96.67	488
Average household income	46302.94	16094.56	13333.2	143742	488
Median household income	38285.51	13711.8	9698.6	99841	488
Average gross rent	639.41	164.75	260	1250.2	488
Average dwelling value	184288.9	137101.39	38018	894514.58	488

## Initial conditions - Census tracts beyond 2 miles

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min.</b>	<b>Max.</b>	<b>N</b>
Total population	20352.62	24228.02	53.2	144810.2	4059
Share - Age below 15	18.85	5.28	0.07	38.69	4059
Share - Age 65 and over	11.7	5.66	1.06	62.53	4059
Share - Male	48.88	1.89	36.29	71.28	4059
Share - Married	54.64	9.92	10.4	84.04	4059
Unemployment rate	7.38	3.13	0	30.02	4059
Share - Owner occupied	66.23	20.15	0.34	98.79	4059
Average household income	63232.78	25204.14	13146	457524	4059
Median household income	52791.18	16573.09	10367	174947.4	4059
Average gross rent	781.11	222.69	113	2354.2	4059
Average dwelling value	266463.81	181972.56	25702.4	1667072	4059

## Initial conditions - Side by side comparison

Variable	Within 2 miles		Outside 2 miles	
	Mean	Std. Dev.	Mean	Std. Dev.
Total population	9070.69	10047.52	20352.62	24228.02
Share - Age below 15	15.91	6.12	18.85	5.28
Share - Age 65 and over	13.84	6.52	11.7	5.66
Share - Male	49.04	2.73	48.88	1.89
Share - Married	45.14	12.16	54.64	9.92
Unemployment rate	9.44	4.25	7.38	3.13
Share - Owner occupied	49.77	22.24	66.23	20.15
Average household income	46302.94	16094.56	63232.78	25204.14
Median household income	38285.51	13711.8	52791.18	16573.09
Average gross rent	639.41	164.75	781.11	222.69
Average dwelling value	184288.9	137101.39	266463.81	181972.56

## Initial conditions: PSM sample

Variable	Within 2 miles		Outside 2 miles	
	Mean	Std. Dev.	Mean	Std. Dev.
Total population	9190.88	9524.59	11797.98	14181.04
Share - Age below 15	15.84	5.84	16.96	5.39
Share - Age 65 and over	13.39	5.86	13.95	6.73
Share - Male	49.03	2.52	48.59	2.12
Share - Married	45.73	11.66	49	11.04
Unemployment rate	9.08	3.96	8.48	3.61
Share - Owner occupied	50.82	21.72	56.76	21.79
Average household income	47875.34	15911.7	50336.38	17054.11
Median household income	39574.22	13215.53	42301.69	15124.72
Average gross rent	657.46	170.37	687.06	185.08
Average dwelling value	197782.23	143913.39	195898.43	132748.31

Notes: Matches are within same city and same period allowing replacement. Treated=1 if a tract is within 2 miles of a new casino. The propensity scores are from a probit model. All the initial profile variables above are used as predictors. A "treated" tract is matched to one closest neighbor. About 100 "treated" tracts are discarded due to lack of a match within a caliper that is equal to 0.2 standard deviation of the logit of the full-sample propensity scores. The above statistics are based on 382 pairs of successful matches. The sample size is smaller for some outcome variables.

## Post Opening Growth over 5 Years - Full sample

Variable	Mean	Std. Dev.	Min.	Max.	N
Growth: population					
Outside 2 miles	5.99	8.91	-21.16	36.59	4059
Within 2 miles	2.74	8.07	-17.5	36.53	488
Change: share-below 15					
Outside 2 miles	-1.12	1.17	-4.52	3.06	4119
Within 2 miles	-0.86	1.11	-4.51	2.42	482
Change: share-65 & above					
Outside 2 miles	0.89	1.24	-3.75	4.81	4081
Within 2 miles	0.35	1.48	-3.7	4.60	477
Change: share-male					
Outside 2 miles	-0.06	0.49	-2.08	2.2	4088
Within 2 miles	0.07	0.74	-2.15	2.17	473
Change: share-married					
Outside 2 miles	-1.82	1.88	-7.88	3.72	4083
Within 2 miles	-2.29	2.03	-7.76	3.53	479
Change: share-owner occupied					
Outside 2 miles	1.92	2.32	-6.34	9.72	2943
Within 2 miles	1.63	2.73	-5.56	9.34	363

## Post Opening Growth over 5 Years - Full sample

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min.</b>	<b>Max.</b>	<b>N</b>
Change: share-unemployed					
Outside 2 miles	-1.27	1.53	-7.16	3.94	2960
Within 2 miles	-1.91	1.89	-6.76	3.68	354
Growth: avg. income					
Outside 2 miles	15.74	8.59	-10.45	50.78	2967
Within 2 miles	16.68	8.85	-7.53	48.35	362
Growth: median income					
Outside 2 miles	13.09	8.51	-11.11	46.07	2988
Within 2 miles	15.22	9.54	-10.87	45.81	359
Growth: avg. gross rent					
Outside 2 miles	9.04	10.26	-21.84	50.47	2964
Within 2 miles	8.83	9.26	-19.11	46.63	368
Growth: avg. dwelling value					
Outside 2 miles	29.65	25.65	-22.59	104.97	2980
Within 2 miles	20.05	17.77	-22.59	80.78	366



## Post Opening Growth over 5 Years - PSM tracts

Variable	Mean	Std. Dev.	Min.	Max.	N
Growth: population					
Outside 2 miles	4	9.27	-16.96	36.06	382
Within 2 miles	2.89	8.35	-17.5	36.53	382
Change: share-below 15					
Outside 2 miles	-0.85	1.16	-4.17	2.71	373
Within 2 miles	-0.85	1.09	-4.51	2.42	373
Change: share-65 & above					
Outside 2 miles	0.18	1.47	-3.46	4.73	378
Within 2 miles	0.44	1.45	-3.52	4.60	378
Change: share-male					
Outside 2 miles	0.14	0.73	-2.08	2.18	376
Within 2 miles	0.05	0.73	-2.09	2.11	376
Change: share-married					
Outside 2 miles	-2.2	1.9	-7.88	3.57	374
Within 2 miles	-2.22	1.98	-7.65	3.36	374
Change: share-owner occupied					
Outside 2 miles	1.29	2.77	-5.93	8.87	293
Within 2 miles	1.61	2.66	-5.56	9.34	293

## Post Opening Growth over 5 Years - PSM tracts

Variable	Mean	Std. Dev.	Min.	Max.	N
Change: share-unemployed					
Outside 2 miles	-1.68	1.91	-6.83	3.68	284
Within 2 miles	-1.9	1.86	-6.76	3.66	284
Growth: avg. income					
Outside 2 miles	14.65	7.31	-2.85	41.37	283
Within 2 miles	16.25	8.99	-6.67	48.35	283
Growth: median income					
Outside 2 miles	13.87	8.12	-5.11	46.01	279
Within 2 miles	14.57	9.23	-10.87	45.81	279
Growth: avg. gross rent					
Outside 2 miles	8.44	9.80	-19.65	43.89	288
Within 2 miles	8.35	9.34	-19.11	46.63	288
Growth: avg. dwelling value					
Outside 2 miles	21.72	19.48	-13.48	101.09	286
Within 2 miles	19.67	18.62	-22.59	80.78	286

## Regression Models

- Regressions on full sample controlling initial local profile
- Regressions on Propensity Score Match (PSM) sample
- Allowing stronger centre effects

## DV is 5-yr Changes in Unemployment Rate - Part 1

	Full sample	Full sample	PSM
Within-2-mile indicator (Centre effect)	-.79 (0.29)**	-.33 (0.31)	-.65 (0.3)*
Within-2-mile indicator*Distance to casino	0.3 (0.17)	0.16 (0.18)	0.33 (0.19)
Distance to casino	0.02 (0.008)	-.008 (0.01)	0.006 (0.02)
Casino fixed effects	Yes	Yes	Yes
Population size (log)		0.07 (0.06)	0.28 (0.2)
Share - age below 15		0.01 (0.02)	0.07 (0.04)
Share - age 65 and above		0.006 (0.01)	0.04 (0.02)
Share - male		-.02 (0.03)	0.18 (0.06)**
Share - married		0.03 (0.02)	0.004 (0.02)

## DV is 5-yr Changes in Unemployment Rate - Part 2

	Full sample	Full sample	PSM
Unemployed rate		-0.26 (0.05)**	-0.45 (0.06)**
Share - owner occupied housing		-0.008 (0.004)*	-0.009 (0.01)
Avg. household income (log)		0.68 (0.53)	3.24 (1.66)
Median household income (log)		-2.09 (0.57)**	-4.64 (1.41)**
Avg. gross rent (log)		0.95 (0.31)**	-1.44 (0.75)
Avg. dwelling value (log)		0.35 (0.38)	-0.008 (0.73)
Number of observations	3314	3314	568
Number of casinos*2: clusters	74	74	74
r-sq	0.3	0.45	0.48

## DV is 5-yr Growth in Avg Household Income - Part 1

	Full sample	Full sample	PSM
Within-2-mile indicator	1.27 (1.22)	0.41 (1.13)	1.85 (1.21)
Within-2-mile indicator*Distance to casino	-.03 (0.69)	0.22 (0.69)	-.05 (0.77)
Distance to casino	0.12 (0.04)**	0.04 (0.04)	0.2 (0.07)**
Casino fixed effects	Yes	Yes	Yes
Population size (log)		-1.13 (0.21)**	-.31 (0.67)
Share - age below 15		0.6 (0.07)**	0.36 (0.1)**
Share - age 65 and above		0.18 (0.05)**	0.01 (0.08)
Share - male		0.59 (0.14)**	-.11 (0.16)
Share - married		-.32 (0.04)**	-.36 (0.07)**

## DV is 5-yr Growth in Avg Household Income - Part 2

	Full sample	Full sample	PSM
Unemployed rate		-0.42 (0.06)**	-0.06 (0.13)
Share - owner occupied housing		0.06 (0.03)	0.21 (0.04)**
Avg. household income (log)		-2.18 (6.10)	-23.65 (6.95)**
Median household income (log)		-0.45 (3.31)	6.47 (4.89)
Avg. gross rent (log)		-4.44 (2.24)*	2.15 (2.54)
Avg. dwelling value (log)		11.00 (1.60)**	17.88 (3.57)**
Number of observations	3329	3329	566
Number of casinos*2: clusters	74	74	74
r-sq	0.45	0.55	0.65

## DV is 5-yr Growth in Average Rent - Part 1

	Full sample	Full sample	PSM
Within-2-mile indicator	-2.59 (1.76)	-2.78 (1.70)	-1.80 (1.87)
Within-2-mile indicator*Distance to casino	0.85 (1.01)	0.66 (0.91)	0.6 (0.98)
Distance to casino	0.04 (0.04)	0.02 (0.06)	-.06 (0.21)
Casino fixed effects	Yes	Yes	Yes
Population size (log)		-.23 (0.25)	-.04 (0.86)
Share - age below 15		0.05 (0.1)	0.02 (0.17)
Share - age 65 and above		0.09 (0.05)	-.10 (0.12)
Share - male		0.22 (0.12)	-.13 (0.26)
Share - married		-.01 (0.07)	-.05 (0.14)



## DV is 5-yr Growth in Average Rent - Part 2

	Full sample	Full sample	PSM
Share - owner occupied housing		-0.10 (0.04)**	-0.08 (0.05)
Avg. household income (log)		2.38 (4.34)	-1.10 (6.40)
Median household income (log)		9.20 (4.43)*	13.91 (7.03)*
Avg. gross rent (log)		-22.47 (2.57)**	-29.82 (6.19)**
Avg. dwelling value (log)		2.33 (0.92)*	4.07 (3.71)
Number of observations	3332	3332	576
Number of casinos*2: clusters	74	74	74
r-sq	0.41	0.48	0.56

## DV is 5-yr Growth in Avg Housing Value - Part 1

	Full sample	Full sample	PSM
Within-2-mile indicator	-2.25 (1.34)	-3.03 (1.36)*	-2.53 (1.93)
Within-2-mile indicator*Distance to casino	1.17 (0.89)	1.04 (0.81)	0.85 (1.18)
Distance to casino	0.11 (0.06)	0.002 (0.06)	0.04 (0.12)
Casino fixed effects	Yes	Yes	Yes
Population size (log)		-1.71 (0.36)**	-3.65 (0.99)**
Share - age below 15		0.32 (0.1)**	0.27 (0.16)
Share - age 65 and above		0.18 (0.09)*	0.006 (0.15)
Share - male		0.82 (0.28)**	0.13 (0.31)
Share - married		-.13 (0.09)	-.09 (0.14)

## DV is 5-yr Growth in Avg Housing Value - Part 2

	Full sample	Full sample	PSM
Unemployed rate		-.74 (0.18)**	-.36 (0.23)
Share - owner occupied housing		-.07 (0.07)	-.12 (0.06)
Avg. household income (log)		2.69 (2.43)	14.81 (9.12)
Median household income (log)		3.20 (3.92)	0.55 (8.74)
Avg. gross rent (log)		-5.00 (3.09)	-5.32 (5.98)
Avg. dwelling value (log)		-2.90 (3.39)	-7.99 (4.73)
Number of observations	3346	3346	572
Number of casinos*2: clusters	74	74	74
r-sq	0.89	0.9	0.85

## Using Only Casinos Located in Large Urban Population Centres

	Full sample-1	Full sample-2	PSM
DV is 5-yr Change in Unemployment Rate			
Centre effect	-0.80 (0.34)*	-0.38 (0.35)	-0.73 (0.34)*
DV is 5-yr Growth in Avg Household Income			
Centre effect	0.93 (1.36)	-0.23 (1.19)	2.18 (1.21)
DV is 5-yr Growth in Avg Gross Rent			
Centre effect	-2.64 (2.05)	-2.89 (1.94)	-2.34 (2.09)
DV is 5-yr Growth in Avg Housing Value			
Centre effect	-3.00 (1.53)*	-4.22 (1.48)**	-2.34 (2.15)
Number of casinos*2: clusters	56	56	56

## Conclusion

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Important to control for initial conditions

- Casino locations are not random
- Significant effects found in naive comparisons disappear in regressions with controls, or in PSM samples