Announcement of Northern Metropolis Plan Changes Housing Prices, Consumption, and Demographics, though Inconclusive on Inequality

Yi Fan[*], Chongyu Wang[†], Ke Xu[‡]

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Abstract

Using announcement of the Northern Metropolis Plan in Hong Kong in October 2021 as a quasi-natural experiment, we discern its immediate impact on household behaviors, including housing price, consumption, and demographic changes. Drawing from a rich dataset spanning 100,576 housing transaction records, 4.7 million consumption records, and demographic data across 18 districts, our difference-in-differences analysis indicates a marked 3.9% rise in housing prices in the Northern Metropolis region one year after the announcement, with a profound 6.9% surge in the initial 4 months. Additionally, we discover a swift 4.1% uptick in consumption for residents in the treated region in the same initial 4 months, predominantly within the private housing market possibly with expected housing wealth realization. Last, we observe a notable inflow of higher-educated individuals, higher-income households, households with children, and increased school enrollment in the Northern Metropolis. Regionally, we observe a spillover effect by rising housing prices and increased transactions in Shenzhen housing market. While our short-term findings hint at narrowing cross-region inequality in the global superstar city, they also suggest burgeoning within-region inequality—particularly challenging to estimate over the long term—as benefits seem skewed towards individuals with higher socioeconomic profiles. We thus call for policy attention on the affordability and welfare of individuals with lower socioeconomic status in the targeted region under mega projects.

[*] National University of Singapore. yi.fan@nus.edu.sg

[†] Florida State University. cwang@business.fsu.edu

[‡] The University of Hong Kong. xkelly103@connect.hku.hk

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Place-based policies are government efforts designed to foster economic development and well-being within specific geographic areas (Freedman and Neumark, 2024). These policies, often involving large-scale public spending and government efforts, have become pivotal to stimulating private sector investment and economic growth (Duranton and Venables, 2018). While existing research typically evaluates their effects on economic and job growth, it often overlooks the immediate role of individual and household behavior in shaping these outcomes. Specifically, little is known about how people respond to policy announcements at the granular level—adjusting their consumption and migration decisions even before any physical infrastructure materializes (Agrawal et al., 2022; LaPoint and Sakabe, 2021). In addition, the effects of place-based policies might extend beyond their target zones through labor mobility, housing markets, and industrial linkages (Neumark and Simpson, 2015; Lu et al., 2019). These gaps limit our understanding of how such policies shift demand for local amenities and housing, which are the very channels through which policy blueprints begin to take concrete economic and social form.

We use the announcement of the Northern Metropolis Plan in Hong Kong as a quasi-natural experiment to bridge this understanding gap. On 6 October 2021, Carrie Lam, the Chief Executive of Hong Kong, unveiled an ambitious plan to transform two remote districts, North and Yuen Long—accounting for 27% of Hong Kong's total area and bordering Shenzhen, China's third-largest city after Shanghai and Beijing—into Northern Metropolis. The long-term aspirations are to alleviate the city's notorious housing affordability crisis and foster a new high-tech hub. Notably, Hong Kong has championed the world's least affordable housing market for an unprecedented 13th year. Providing affordable public housing to vulnerable residents is a remedy to cure the unrest. It is projected to build an additional 500,000 housing units to accommodate 1.5 million more residents (i.e., 1/5 of the total population) and create 500,000 new jobs, including 150,000 positions in the IT sector (Bloomberg, 2021) (policy details in Appendix Table A1). The enactment of the Northern Metropolis policy

provides a valuable policy arena to estimate how a massive urban development plan can alter human behaviors and affect regional economic development, both in the short term and over the long haul.

Equipped with highly dynamic, granular datasets, this paper examines how households respond to the announcement of the Northern Metropolis plan—through changes in housing demand, consumption behavior, and migration—and whether such responses vary across demographic groups. We also consider its potential spillover effects on neighboring Shenzhen, shedding light on how place-based policies can reshape regional dynamics beyond their intended boundaries.

We begin by assessing the impact of the policy on household behavior, using a difference-in-differences (DiD) framework that leverages the announcement of the policy as an exogenous shock. The North and Yuen Long districts—two of Hong Kong's eighteen districts—serve as the treatment group, while the remaining districts constitute the control group. To measure shifts in households' home purchasing decisions, we analyze 100,576 housing transaction records spanning October 2020 to October 2022. Our results show a significant 3.9% increase in average transaction prices within the treatment group one year after the policy announcement. The most pronounced rise of 6.9% occurred within four months after the announcement. For context, the average annualized return on private residential property in Hong Kong from 2015 to 2025 is merely 1.96%.

Next, we examine household consumption behavior following the announcement. Prior literature shows that household consumption is often excessively sensitive to macroeconomic news (Garmaise et al., 2024). Drawing from a rich dataset of approximately 4.7 million transaction records from Hong Kong's leading online shopping platform, we observe that the total amount of orders placed by customers within the Northern Metropolis areas surged by nearly 4.1% after the policy was enacted. This rise in consumption closely mirrors the estimated increase in housing values, consistent with the Permanent Income Hypothesis (PIH). Intriguingly, this consumption buoyancy is concentrated among

residents of private housing estates, who are likely more affluent and responded more strongly to perceived gains in housing wealth by refining their consumption preferences in the policy's wake.

We further delve into the policy's impact on demographic composition. Following the announcement, the share of higher-educated residents (defined as those with a post-secondary degree or above) within the Northern Metropolis surged by 6.54%. The number of high-income households (monthly income above 30,000 HKD, approximately 3,822 USD) increased by 9.04%, and the number of family-oriented households—proxied by households with more than 2 family members—increased by 5.22%. These education-related effects reveal deeper societal shifts: we observe a 9.58% surge in school enrollment, which reflects forward-looking decisions by local households and offers a lens into how place-based policies may shape intergenerational outcomes (Black et al., 2020; Agarwal et al., 2023; Daysal et al., 2023; Yu et al., 2023; Weiwu, 2025). These trends in residential sorting, we note, extend beyond conventional cross-sectional patterns of inter- and intra-regional inequality.

No local policy exists in a vacuum; instead, its outcomes are shaped not only by direct effects but also by interactions with neighboring jurisdictions (Agrawal et al., 2022). Located within the Guangdong-Hong Kong-Macao Greater Bay Area (GBA), China's dynamic southern megaregion and the world's 10th largest economy, the success of Northern Metropolis will depend on how effectively it integrates with neighboring Shenzhen. To assess potential cross-border spillovers, we examine how the announcement of the policy in Hong Kong affected Shenzhen. We find evidence of modest increases in housing prices and transaction volume in Shenzhen following the announcement, with a lag of several months. This spillover effect suggests the policy is reshaping economic geography by extending its impact beyond the Hong Kong's administrative boundaries.

Our study is inconclusive on inequality. Hong Kong is formidable in its rising inequality. With 125,100 millionaires, the city has 1.6 million people living in poverty (Bloomberg, 2022). The recent unveiling of the Northern Metropolis Plan has yielded significant uplifts in housing prices especially

for homeowners, household consumption, and demographic changes—foreshadowing enduring regional prosperity through rising inequality. Yet, as the disparity between the Northern Metropolis and city centers wanes, the inequality within the Northern Metropolis might amplify. Spiraling housing prices could exacerbate wealth gaps, particularly dichotomies between private and public housing occupants. The unaffordability within the region may deteriorate, pushing the vulnerable at the city border, geographically or economically, to become even more vulnerable. Nevertheless, fueled by the large-scale public housing construction and an influx of higher-educated and higher-income skilled labor in the high-tech sector, the housing unaffordability is likely to be mitigated and a potent multiplier effect could emerge, promising ripple benefits in the non-traded sectors, welfare benefits to the locals and migrants, intra- and inter-generationally.[1] Future studies are warranted along this line with the progress of the Northern Metropolis redevelopment.

Burgeoning articles investigate the socioeconomic consequences of mega projects or place-based policies. For instance, a vast literature has scrutinized the ramifications of large infrastructural undertakings, such as hydropower dams on the environment, population displacement, human livelihoods, economic benefits, and resilience (Moran et al., 2018; Basheer et al., 2021; Holtgrieve and Arias, 2022; Galelli et al., 2022), or the environmental, social and economic consequences of expanded network of roads (Vilela et al., 2020; Diao et al., 2021; Lin et al., 2021). We align with this set of growing literature to advance understanding of the socioeconomic consequences of mega projects. Specifically, we investigate the announcement effect of a very recent government-led mega project, which is poised to reshape the lives of more than 1 million present inhabitants and to draw 1/3 population from congested city centers in two decades. To the best of our knowledge, we are the first to provide a holistic view of the effect of the Northern Metropolis plan on household behaviors, including housing, consumption, demographic changes, and regional spillovers. Different from

[1] Notably, the multiplier effect of high-tech employment is three times larger than that in traditional manufacturing industries (Moretti and Thulin, 2013). Additionally, skilled workers are more innovative and react more quickly to economic shocks, and thus are expected to contribute to the reinvention of cities (Glaeser et al., 2004).

literature focusing on post-implementation policy impacts, our analysis of the announcement effect offers a forward-looking lens for policy implementation and adjustment, fostering a future-proof city.

In essence, the Northern Metropolis plan is parallel to the Economic Zone Program in P.R. China (Lu et al., 2019), the Opportunity Zones in the U.S. (Chen et al., 2023), the Enterprise Zone policies in France (Neumark and Simpson, 2015), Urban Revitalization Program in the Netherlands (Koster and Ommeren, 2019), Initiative for the Integration of Regional Infrastructure in South America (Vilela et al., 2020), and megaprojects such as building large dams and oil sands mining (Rooney et al., 2015; Moran et al., 2018). Additionally, in recent years, the adoption of industrial policies—a set of specific policy tools designed to bolster sectors deemed strategically important—has become common as means to tackle market failures and promote rapid, broadly shared economic growth. This raises the pertinent question: Why do certain sectors warrant government backing? Our findings suggest that the Northern Metropolis policy, particularly the contents favoring the high-tech industry like the San Tin Technopole, have the potential to attract skilled labor but come at the expense of exacerbating inequalities.

Results

Short-term impact on housing price, consumption, and demographic change

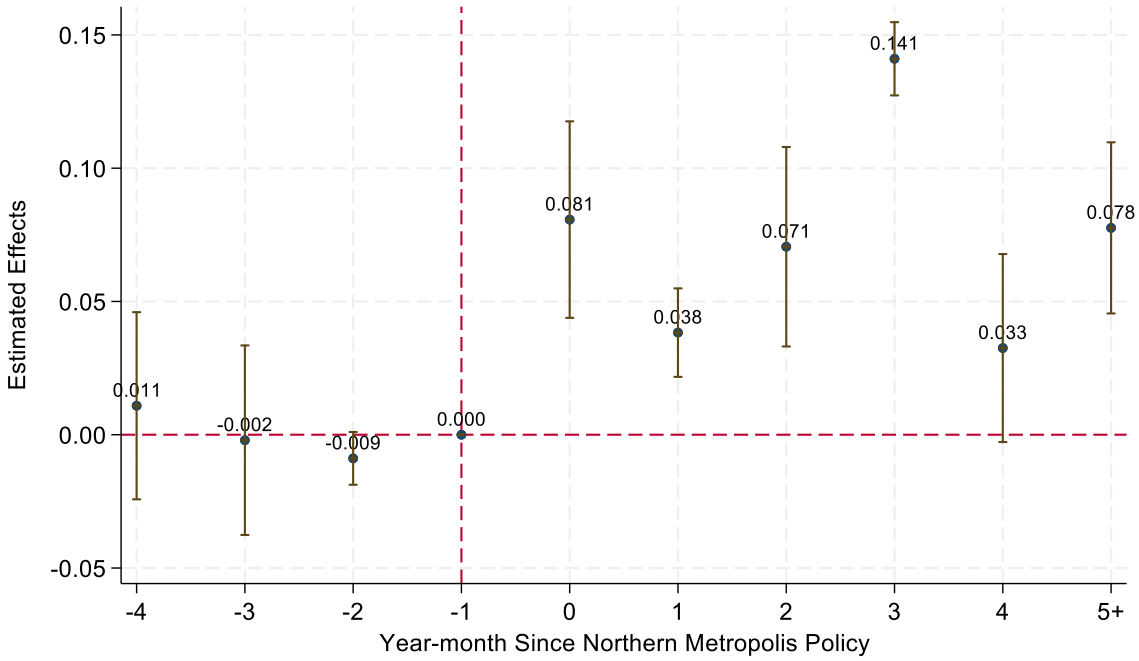
Housing price. Place-based policies influence economic outcomes not only through physical investment or infrastructure development but also by shaping expectations and triggering behavioural responses among households. For instance, policy announcements often lead to shifts in housing demand, as potential buyers revise their willingness to pay in anticipation of improved local amenities, employment opportunities, or regional connectivity (Duranton and Venables, 2018; Bilal and Rossi-Hansberg, 2021). These effects tend to be more pronounced in areas with inelastic housing supply, where projected future gains are quickly capitalized into land values or housing costs (Austin et al., 2018).

To assess whether such anticipatory (behavioural) shifts occurred following the announcement of the Northern Metropolis policy, we examine short-term changes in housing prices, online consumption, and demographic composition in the treated area.[2] For housing prices specifically, we estimate a DiD model that controls for housing hedonics such as building age, floor level, and unit size to isolate the impact of the policy. The Methods Section details data sources and estimation strategy, with variable definitions and summary statistics presented in Appendix Tables A2 and A3, respectively.

The plausibly exogenous nature of the policy shock is supported by the unexpected timing of the announcement, which occurred during the leadership transition between chief executives. This reduces the likelihood that the announcement was anticipated or strategically timed relative to local market conditions. To further validate our identification strategy, we test and confirm the parallel trends assumption: in the absence of the policy, housing prices in the Northern Metropolis area and the rest of Hong Kong would have trended similarly. Figure 1 provides visual support for the parallel trends assumption. In contrast, we observed a clear divergence in post-announcement housing price trajectories, most notably in the fourth month after the policy was enacted.

[2] While analyzing short-term impacts, we also explore the policy's long-term economic implications using an extended Cobb-Douglas production function and a gravity model focusing on four key dimensions: economic development, income growth, housing affordability, and migration, as presented in the Discussion Section.

Figure 1: The Impact of Northern Metropolis Policy on Housing Price



Note: This figure depicts event time coefficients, showcasing the differential impacts of the policy on residential properties. The coefficient for the month immediately before the policy implementation is normalized to zero. Year-month and district fixed effects are included. Standard errors are adjusted for clustering at year-month and district levels.

Next, we examine the housing prices responded to the policy announcement, within and outside the Northern Metropolis area. We find that the average housing price in the Northern Metropolis area increased by 7.6% (733,780 HKD or 93,475 USD) within four months and by 5.0% (482,750 HKD or 61,497 USD) within one year of the announcement, controlling for housing features, year-month, and district fixed effects (columns (1)-(2) in Table 1).[3] To account for unobserved factors that may vary across time and regions, we further include year-month-by-region fixed effects. The corresponding point estimates, which we view as our preferred specifications, remain significant at the 1% level, though slightly attenuated to 6.9% and 3.9% (666,195 HKD/84,866 USD and 376,545 HKD/47,968 USD for an average home, respectively; Table 1, columns (3)-(4)).

[3] For reference, the 2024 median employment earnings of the top 10% of income earners in Hong Kong are HKD 600,000, according to the Census and Statistics Department (https://www.censtatd.gov.hk/tc/wbr.html?ecode=B10500142024AN24\&scode=210).

The magnitude and timing of these price changes suggest households rapidly revised their expectations in response to the announcement of the policy. These early adjustments in willingness to pay—well in advance of any physical development—reflect forward-looking nature of market participants and future payoffs associated with improved housing amenities, connectivity, and neighborhood value. Our results remain robust when restricting the analysis to transactions within the New Territories and winsorizing the top and bottom 1% of observations (see Appendix Table A4).

Table 1: Policy Impact on Increasing Housing Prices in Northern Metropolis Area

	(1)	(2)	(3)	(4)
	Y: Log(Housing Price)			
Variable	[-4, +4] Months	[-12 +12] Months	[-4, +4] Months	[-12 +12] Months
Policy*North	0.0764***	0.0495***	0.0686***	0.0393***
	(0.0225)	(0.0143)	(0.0242)	(0.0148)
Log(Building Age)	-0.1512***	-0.1352***	-0.1516***	-0.1362***
	(0.0051)	(0.0037)	(0.0050)	(0.0037)
Log(Floor)	0.0740***	0.0749***	0.0748***	0.0754***
	(0.0048)	(0.0029)	(0.0047)	(0.0028)
Log(Size)	0.9994***	0.9803***	1.0001***	0.9798***
	(0.0146)	(0.0094)	(0.0144)	(0.0093)
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Year-month*Region FE	NO	NO	YES	YES
Observations	38,214	100,576	38,214	100,576
R-squared	0.7164	0.7145	0.7168	0.7153

Note: This table presents the policy impact on housing prices in the Northern Metropolis area. $Log(HomePrice)_{it}$ is defined as the logarithm of the housing transaction price in million HKD. $Policy_t$ indicates transactions post-October 2021 (i.e., after the announcement). $North_i$ is also a dichotomous variable that equals 1 if the property is located within the Northern Metropolis area and 0 otherwise. We also control property characteristics: building age, floor, and unit size. In columns (1) and (2), results include year-month and district fixed effects. In columns (3) and (4), we also include year-month-by-region fixed effects. Standard errors are adjusted for clustering at year-month and district levels, are included in parentheses, and ***, **, and * indicate 1%, 5%, and 10% significance, respectively.

Finally, we find a similar result when using monthly building-level aggregated transaction amounts as the outcome variable (Appendix Figure A1 and Table 2). These results reinforce our

findings in Table 1, indicating that the announcement of Northern Metropolis policy not only drove up housing prices but also stimulated transaction activity in the area.

Table 2: Policy Impact on Increasing Housing Transaction Amount in Northern Metropolis Area

	(1)	(2)	(3)	(4)
	Y: Log(Aggregated Transaction Amount)			
Variable	[-4, +4] Months	[-12 +12] Months	[-4, +4] Months	[-12 +12] Months
Policy*North	0.0464*	0.0794***	0.0822***	0.1164***
	(0.0271)	(0.0222)	(0.0273)	(0.0211)
Year-month FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Year-month*Region FE	NO	NO	YES	YES
Observations	20,366	52,704	20,366	52,704
R-squared	0.1582	0.1496	0.1589	0.1507

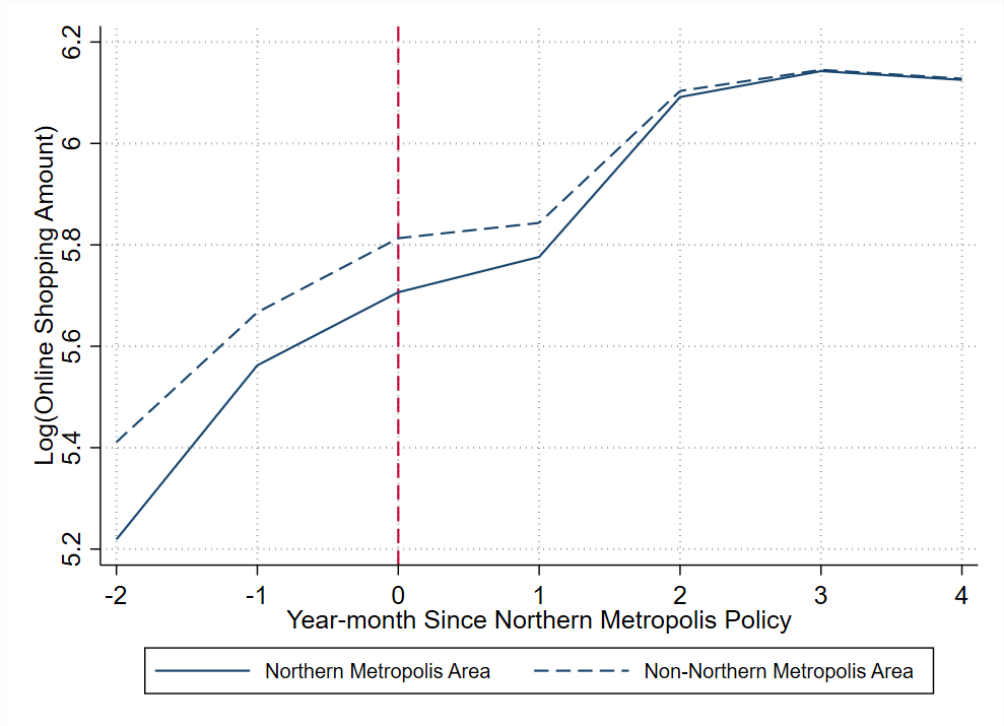
Note: This table presents the policy impact on aggregated transaction amount in the Northern Metropolis area. $Log(Aggregated\ Transaction\ Amount)_{bt}$ is defined as the logarithm of the building-month level transaction amount. $Policy_t$ indicates transactions post-October 2021 (i.e., after the announcement). $North_b$ is also a dichotomous variable that equals 1 if the property is located within the Northern Metropolis area and 0 otherwise. In columns (1) and (2), results include year-month and district fixed effects. In columns (3) and (4), we also include year-month-by-region fixed effect. Standard errors are adjusted for clustering at district levels, are included in parentheses, and ***, **, and * indicate 1%, 5%, and 10% significance, respectively.

Consumption. Beyond housing markets, place-based policies may also affect household consumption by shifting local prices, budget constraints, and expectations. Rising housing costs can crowd out other expenditures, but may also boost consumption through perceived housing wealth gains at least for some households, consistent with the permanent income hypothesis. To explore these competing effects, we analyse the policy impact on online consumption, distinguishing between households living in private and public housing separately.

We use high-frequency consumption data from the largest online shopping platform in Hong Kong to examine the policy's impact on household consumption (see Methods Section for details). It provides order-level transaction records on a daily basis, thereby allowing us to overcome the limitations of aggregate consumption measures, which are typically low frequency and reported with

considerable lags. Using a similar DiD framework, we find a significant surge in online shopping in the Northern Metropolis area. As shown in Figure 2 and Table 3, spending in the treatment group rose sharply relative to other districts approximately four months after the policy announcement, despite parallel trends prior to the announcement.

Figure 2: The Impact of Northern Metropolis Policy on Average Amount of Online Shopping



Note: This figure shows the average online shopping order amounts placed by buyers residing within the Northern Metropolis area (treatment group) and the non-northern Metropolis area (control group). The solid line represents the values for the Northern Metropolis area, while the dashed line represents the values for the non-northern Metropolis area.

Table 3 presents DiD estimates based on our full sample, as well as subsets of order volume for private and public housing, respectively. In addition to the fixed effects specified in Table 1, we further include customer fixed effects to account for unobserved, time-invariant heterogeneity across consumers. Combined with year-month and district fixed effects, this specification should capture the majority of unobservables correlated with the policy's announcement.

Focusing on column (4), we find that the overall order volume within the Northern Metropolis area rose by 4.1% relative to the rest of Hong Kong following the policy announcement. This effect is primarily driven by private housing occupants (column (5)), whose order volume rose by 4.7%, while the increase for public housing residents is modest (column (6)). The difference between the two point estimates is statistically significant at the 1% level. These results remain robust when restricting the sample to orders within the New Territories and winsorizing the top and bottom 1% of observations (see Appendix Table A5). The stronger response among private housing residents suggests that anticipated housing wealth gains led to increased consumption, consistent with the permanent income hypothesis.

Table 3: Policy Impact on Increasing Order-level Online Shopping Amount in Northern Metropolis Area

	(1)	(2)	(3)	(4)	(5)	(6)
	Y: Log(Order-level Online Shopping Amount)					
Variable	[-4, +4] Months	[-4, +4] Months	[-4, +4] Months	[-4, +4] Months	[-4, +4] Months	[-4, +4] Months
	Full samples	Private housing	Public housing	Full samples	Private housing	Public housing
Policy*North	0.0678***	0.0788***	0.0331***	0.0412***	0.0469***	0.0260***
	(0.0033)	(0.0040)	(0.0057)	(0.0034)	(0.0043)	(0.0061)
Year-month FE	YES	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES	YES
Customer FE	YES	YES	YES	YES	YES	YES
Year-month*Region FE	NO	NO	NO	YES	YES	YES
Observations	4,686,504	3,276,863	1,409,641	4,686,504	3,276,863	1,409,641
R-squared	0.4097	0.3963	0.4535	0.4100	0.3967	0.4536

Note: This table presents the policy impact on order-level online shopping amount. $Log(Order-level\ Online\ Shopping\ Amount)_{jt}$ is defined as the logarithm of the order-level total shopping amount in HKD. $Policy_t$ is a dummy variable that equals one if the date of purchase is after October 2021 (i.e., after the announcement), and 0 otherwise. $North_j$ is also a dummy variable that equals one if the buyer is in the Northern Metropolis area and 0 otherwise. In addition to using full samples, we also use private housing and public housing samples separately. In columns (1), (2), and (3), results include year-month, district, and customer fixed effects. In columns (4), (5), and (6), we add the year-month-by-region fixed effect. Standard errors are adjusted for clustering at year-month, district, and customer levels, are included in parentheses, and ***, **, and * indicate 1%, 5%, and 10% significance, respectively.

To further investigate the heterogeneity in consumption patterns, we decompose online order volume into three categories: necessities, non-necessities, and entertainment.[4] As shown in Table A6, private estate occupants in the Northern Metropolis area increase their spending across all three categories after the policy announcement (columns (1), (3), and (5)), whereas public housing occupants only spend more on necessities (column (2)). This disparity is likely attributed to the sale constraint of public housing: while private estate occupants may capitalize on rising property values by selling their homes and realizing capital gains, public housing occupants face stringent resale restrictions that constrain their ability to do so. Our results remain consistent when using a refined counterfactual and winsorizing key variables (Appendix Table A7).

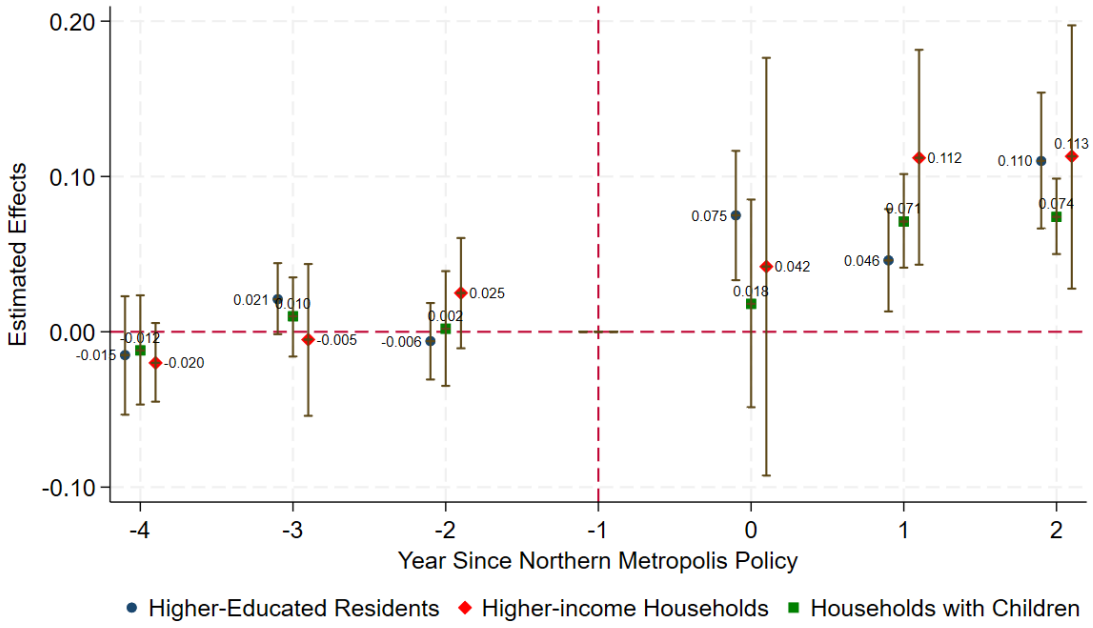
Demographic Changes. Place-based policies can influence human capital accumulation, both through direct investments in education and indirectly by improving neighbourhood environments in ways that shape migration decisions (Agrawal et al., 2022; Weiwu, 2025). Improved access to schools, rising income and employment prospects, and expectations of local growth can encourage family relocation and greater educational attainment, particularly among upwardly mobile households. However, these benefits are often uneven, as more advantaged households are better positioned to capitalize on such opportunities. We examine whether the Northern Metropolis policy has induced early shifts in household composition, especially among families with school-aged children, that may signal emerging trends in human capital accumulation.

As the Northern Metropolis Plan aims to attract skilled labor in the high-tech sector, we expect early migration by more educated and higher-income households. Consistent with this, we observe a post-announcement inflow of higher-educated individuals, higher-income households, and households with children into the Northern Metropolis. These patterns are visually evident in Figure 3, which

[4] We classify online consumption into two main categories: necessities (i.e., housewares, gadgets, and supermarket goods) and non-necessities (i.e., clothes, makeup, skincare, travel, sports, toys, and pets). We further divide non-necessities into entertainment-related (i.e., travel, sports, toys, and pets) versus other discretionary spending.

validate the parallel pre-trends assumption and show a clear divergence between the Northern Metropolis and other districts beginning shortly after the policy announcement. Appendix Table A8 presents the corresponding DiD estimates.

Figure 3: The Impact of Northern Metropolis Policy on Demographic Changes



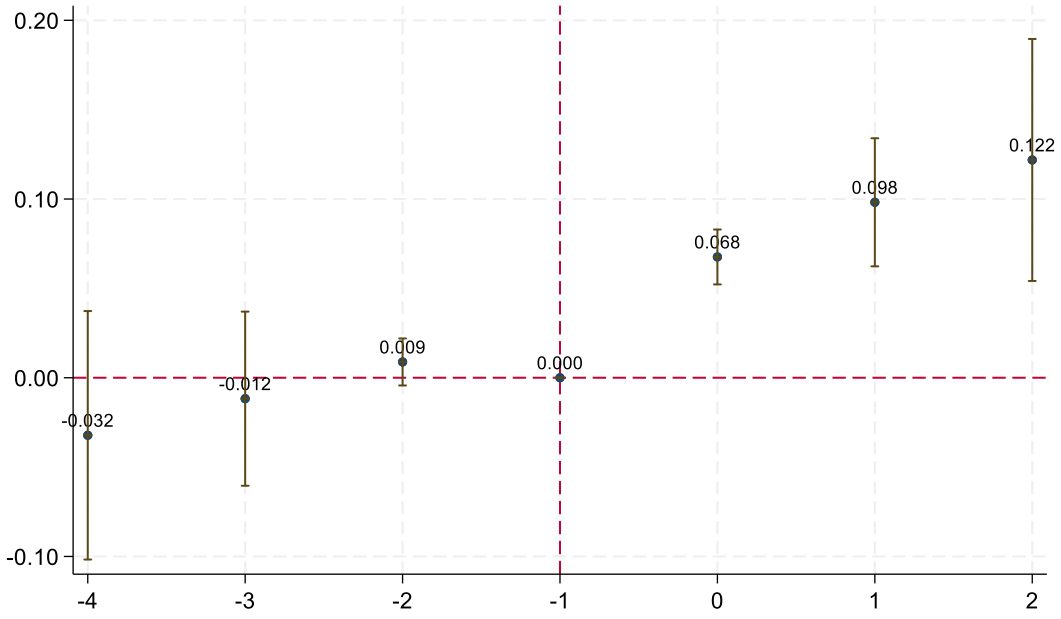
Note: This figure depicts event time coefficients, showcasing the differential impacts of the policy impact on higher-education residents, higher-income households, households with Children. The coefficient for the year immediately before the policy implementation is normalized to zero. Year and district fixed effects are included. Standard errors are adjusted for clustering at the district levels.

Building on the demographic shifts toward more family-oriented households, we find significant increases in school enrolment in secondary school, suggesting that the policy has led to longer-term settlement in the Northern Metropolis area.[5] As shown in Figure 4 and Table 4, total school

[5] We primarily use secondary school enrolment data because cross-border students are predominantly concentrated in kindergarten and primary schools within Hong Kong's North and Yuen Long districts. Due to pandemic-related border closures, which overlapped with our policy time window, this group was unable to attend schools physically in Hong Kong, leading to a sharp decline in their numbers. This disruption will bias our assessment of the Northern Metropolis policy on education in the area. Therefore, we focus on secondary school enrollment data to mitigate this confounding factor.

enrolment in the Northern Metropolis rose by 9.6% following the announcement. Column (3) further indicates a 6.9% expansion in total classes. In contrast, other districts in the New Territories outside the Northern Metropolis ("Outskirt") show smaller enrolment changes in school enrolment (column (2)). The spillover effects on total school enrolments are visualized in Appendix Figure A2.

Figure 4: The Impact of Northern Metropolis Policy on School Enrolment



Note: This figure depicts event time coefficients, showcasing the differential impacts of the policy on school enrolment. The coefficient for the year immediately before the policy implementation is normalized to zero. Year and district fixed effects are included. Standard errors are adjusted for clustering at the district level.

Table 4: Policy Impact on Increasing School Enrolment in Northern Metropolis Area

	(1)	(2)	(3)	(4)
	Y: Log(Total Enrolment)		Y: Log(Total Classes)	
Policy*North	0.0958***	0.1132***	0.0687**	0.0713*
	(0.0312)	(0.0304)	(0.0299)	(0.0346)
Policy*Outskirt		0.0405**		0.0061
		(0.0165)		(0.0239)
HHIncome	YES	YES	YES	YES

Year FE	YES	YES	YES	YES
District FE	YES	YES	YES	YES
Observations	126	126	126	126
R-squared	0.9973	0.9977	0.9908	0.9909

Note: This table presents the policy impact on school enrollment in the Northern Metropolis area. The dependent variable is defined as the logarithm of annual district-level school enrolments and operating classes. $Policy_t$ is a dummy variable that equals one for all observations in the post-policy period (2021 and later), and 0 otherwise. $North_d$ is also a dummy variable that equals one if the data is of the Northern Metropolis area and 0 otherwise. $Outskirt_d$ is a dummy variable that equals one if the data is of the New Territories but not within the Northern Metropolis area and 0 otherwise. We also control district-level median monthly household income as macroeconomic controls. Results include year and district fixed effects. Standard errors are adjusted for clustering at the district level, are included in parentheses, and ***, **, and * indicate 1%, 5%, and 10% significance, respectively.

Taking together, these findings suggest that the Northern Metropolis is becoming increasingly attractive to a more educated, affluent, and family-oriented population following the announcement. This early demographic shift signals a growing perception of the area as a vibrant place for long-term residence and child-rearing. If sustained by coordinated investments in housing supply, educational capacity, and transportation, these changes could lay the groundwork for resilient economic prosperity and social mobility.

Regional Spillover. The effects of place-based policies often extend beyond their target area (Neumark and Simpson, 2015; Corinth and Feldman, 2024; Fajgelbaum and Gaubert, 2025). The Northern Metropolis, located at the northern edge of Hong Kong and adjacent to downtown Shenzhen, is particularly positioned to generate cross-border spillovers. Specifically, as households update their expectations, the policy may reshape migration patterns, housing demand, and economic activity both within Hong Kong and across the boundary into mainland China.

We examine cross-border spillovers by comparing housing market responses between five Shenzhen border subdistricts directly impacted by the Northern Metropolis Plan (Yuehai, Nantou,

Futian, Fubao, and Huangbei) and other areas in Nanshan, Futian and Luohu districts.[6][7] While the Northern Metropolis plan led to immediate housing price adjustments within the targeted Hong Kong districts, we find a more gradual response across the border: specifically, housing prices in the Shenzhen border subdistricts began to rise about three months after the announcement, as shown in Appendix Figures A3 and A4.

Building on the gradual cross-border response observed in housing prices, we formally test the cross-border spillovers using a DiD framework. As shown in columns (2) in Table 5, average housing prices in the Shenzhen border subdistricts increased by 4.17% within 12 months of the announcement, controlling for housing features, year-month, and subdistrict fixed effects. Taking potentially time-varying unobserved factors into account, we further include year-month-by-district fixed effects in columns (4). The corresponding point estimate is 3.78%, suggesting that unobserved district-specific shocks may have biased the baseline estimate downward. We find similar evidence when using transaction volume aggregated at the building-month level as the outcome variable (Appendix Table A9).

Taken together, our findings suggest that the impact of the Northern Metropolis plan is not confined to the directly targeted areas in Hong Kong but also extends to closely linked regions in Shenzhen. The delayed yet significant housing market responses in the Shenzhen border subdistricts highlight the importance of considering interregional spillovers when evaluating the implications of large-scale place-based policies.

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[6] For the transportation development in Northern Metropolis Plan, firstly, Hong Kong government will construct Hong Kong-Shenzhen western rail to upgrade the transport linkage with the Qianhai area in Shenzhen. This project will impact two metro stations in Shenzhen: Shenzhen Bay Port station (*Yuehai* subdistrict) and Qianhai Bay station (*Nantou* subdistrict). Secondly, Hong Kong government will construct the northern link spur line to link the Hong Kong-Shenzhen Innovation and Technology Park (adjacent to *Futian* subdistrict) and new Huanggang port (*Fubao* subdistrict). Thirdly, Hong Kong government will construct the northern link eastward extension to develop Man Kam To area (adjacent to *Huangbei* subdistrict).

[7] China's urban governance follows a top-down hierarchy: municipality, district (区, qū), subdistrict (街道, jiēdào), and community. A district is a major administrative unit, akin to a borough or large U.S. county, while a subdistrict is a lower-level division responsible for neighborhood-level administration through a Subdistrict Office (街道办事处, jiēdào bànshìchù). For example, the treated subdistricts *Yuehai* and *Nantou* fall under Nanshan district, *Futian* and *Fubao* belong to Futian district and *Huangbei* belongs to Luohu district.

Table 5: Policy Impact on Increasing Housing Prices in Bordering Area in Shenzhen Housing Market

	(1)	(2)	(3)	(4)
	Y: Log(Housing Price)			
Variable	[-4, +4] Months	[-12 +12] Months	[-4, +4] Months	[-12 +12] Months
Policy*Border	0.0697*	0.0417**	0.0554	0.0378*
	(0.0386)	(0.0198)	(0.0414)	(0.0212)
Log(Building Age)	-0.1383***	-0.0933***	-0.1365***	-0.0938***
	(0.0272)	(0.0152)	(0.0272)	(0.0151)
Log(Floor)	0.0325	0.0121	0.0344	0.0124
	(0.0223)	(0.0081)	(0.0228)	(0.0081)
Log(Size)	0.4158***	0.4947***	0.4181***	0.4947***
	(0.0332)	(0.0216)	(0.0335)	(0.0216)
Year-month FE	YES	YES	YES	YES
Subdistrict FE	YES	YES	YES	YES
Year-month*District FE	NO	NO	YES	YES
Observations	3,916	16,602	3,916	16,602
R-squared	0.2128	0.3299	0.2188	0.3341

Note: This table presents the policy impact on housing prices in bordering area in Shenzhen housing market. $Log(HomePrice)_{it}$ is defined as the logarithm of the housing transaction price in million CNY. We winsorize the top and bottom 5% of observations to mitigate the influence of outliers. This adjustment is necessary because the 5th percentile housing price in our sample period (370,000 CNY or 51,000 USD) falls substantially below Shenzhen's average market price during the same period (3,500,000 CNY). $Policy_t$ indicates transactions post-October 2021 (i.e., after the announcement). $Border_i$ is also a dichotomous variable that equals 1 if the property is located within the bordering area in Shenzhen and 0 otherwise. We define the bordering area in Shenzhen as the five border-adjacent subdistricts in Shenzhen (Yuehai, Nantou, Futian, Fubao, and Huangbei). We also control property characteristics: building age, floor, and unit size. In columns (1) and (2), results include year-month and subdistrict fixed effects. In columns (3) and (4), we also include year-month-by-district fixed effect. Standard errors are adjusted for clustering at year-month and district levels, are included in parentheses, and ***, **, and * indicate 1%, 5%, and 10% significance, respectively.

Discussion

This study offers a meticulous assessment of the Northern Metropolis policy, a major place-based intervention announced in October 2021. The Northern Metropolis policy aims to transform the North and Yuen Long districts of Hong Kong into integrated hubs for living, working, and commuting. Like other "Mega-projects," the Northern Metropolis policy seeks to catalyze economic development in underutilized areas by addressing a broad range of issues: tackling disparities pertaining to certain

locations, increasing the supply of housing, strengthening transportation connections, fostering innovation hubs and clusters, preserving natural spaces, highlighting cultural heritage, and involving local communities in decision-making processes.

Our findings reveal rapid and significant changes in human behavior shortly after the policy's announcement. Within merely four months, households responded swiftly to the policy announcement, adjusting their consumption and migration decisions, well ahead of any physical changes that were in place. This pattern is consistent with PIH, which posits that households make decisions based not only on their current income level but also on their expectations of lifetime resources. In this context, households appear to have updated their beliefs about the long-term growth potential associated with the Northern Metropolis and responded accordingly. Housing consumption thus emerges as an early indicator, often preceding tangible capital deployment and labor market changes. These findings also highlight the salience of policy narratives in shaping expectations and economic behavior well in advance of implementation.

Importantly, the effects of the policy are not uniformly distributed across the population. We document meaningful heterogeneity in responses across demographic groups. Specifically, affluent, highly educated, and family-oriented households were more likely to move into the Northern Metropolis area. These groups tend to have stronger labor market attachment and greater financial flexibility to purchase a home. Consistent with this interpretation, we observe a surge in school enrolment in the area, likely reflecting in-migration by younger, family-oriented households anticipating long-term community development. These groups appear to have internalized the prospective gains from increased spatial connectedness, particularly the planned integration of Shenzhen's high-tech sector with Hong Kong's financial and professional services (e.g., an "industry-led, infrastructure-first" development approach). In contrast, disadvantaged groups such as smaller households, low-income renters, and less-educated individuals may face rising housing and living costs without proportional improvements in access to jobs or social mobility. Without complementary

housing affordability and labor market policy interventions, these potential disparities may exacerbate existing inequalities in opportunity over time.

More broadly, the Northern Metropolis initiative should be viewed not as a vacuum but as an integral component of the GBA development strategy. The GBA framework aims to strengthen functional complementarities between Hong Kong, Shenzhen, and other neighboring cities. For example, the Northern Metropolis is strategically located near Shenzhen and includes projects such as the San Tin Technopole, which is designed to align with Shenzhen's innovation economy through the Guangdong–Shenzhen–Hong Kong–Macao Innovation and Technology Corridor. These cross-border industrial and institutional linkages, if realized, are expected to enhance urban vibrancy by improving the flow of talent, capital, and ideas. Rising housing prices and increased consumption may serve as harbingers of the long-term reorganization of the region's economic geography. We also adopt the Cobb-Douglas production function and the gravity model of migration to present a back-of-the-envelope calculation on the longer-term impact of the Northern Metropolis Plan upon completion on GDP growth, monthly wage increase, housing price escalation, and migrant flow, as detailed in Appendix Section and illustrated in Appendix Figure A5. In a nutshell, we predict that by the end of the plan in two decades, GDP will rise by approximately 162.9 billion USD and the average monthly wage will increase by 712 USD. Private housing prices will climb by merely 5.9%, attributed to the demand being absorbed by new public housing. Around 81,251 migrants will be attracted from neighboring cities in Mainland China. We caution that those estimates are rough and subject to changing socioeconomic conditions.

Nonetheless, implementing these policy goals also entails considerable risks. As articulated by Flyvbjerg (2017), global spending on mega-projects constitutes approximately 8 percent of the world's GDP, yet many of these projects fall short of their intended objectives. A key concern is that efforts to reduce disparities between regions (inter-regional inequality) may unintentionally increase intra-regional disparities. For instance, investments in high-skilled sectors may raise the skill premium,

resulting in wage and housing gaps between skilled and unskilled workers within the same region (Lopez and Morita, 2023). In terms of education, some neighborhoods may benefit from inflows and improved peer quality, while others may lose students and see deteriorating peer quality, potentially compromising or even offsetting overall benefits for children (Weiwu, 2025). The impact of new constructions on the value of existing housing stock also remains contested.[8] These challenges call for targeted interventions that strike a balance between economic efficiency and social equity.

Looking forward, our analysis opens several venues for future research. First, while our findings orbit around immediate household responses, it remains important to assess how the policy impacts firm behavior, particularly through channels such as increased collateral values and relaxed borrowing constraints (LaPoint and Sakabe, 2021). Second, the role of human capital accumulation in shaping regional development merits further attention. Skilled workers are often the first to migrate in response to new opportunities, and their presence can generate broader spillovers, either by stimulating employment growth in the non-traded sector through the "human capital multiplier" (Moretti and Thulin, 2013), or by exacerbating intra-regional inequality if skill-based gains are unevenly distributed. Third, beyond the economic well-being of households, future studies could consider the policy's implications for non-pecuniary aspects of welfare such as health, well-being, and community cohesion.

Taken together, our findings highlight the importance of recognizing both the behavioral consequences of large-scale place-based policies on individuals and households. They indicate the need for coordinated, inclusive policies that leverage the benefits of spatial transformation while mitigating its distributional risks. Hong Kong provides a valuable social laboratory to test the impact of government-led megaprojects on socioeconomic changes, but its success will ultimately hinge on how well these trade-offs are understood and managed. Our findings can guide the development of

[8] Homeowners, wary of the potential declines in home values, may resist public policies aimed at increasing housing supply (Glaeser et al., 2005). Evidence, however, suggested that Mega-projects like the Northern Metropolis policy are much needed because "society has reached a consensus on speeding up quality land supply for housing, social, and economic development." Our findings help shed light on this controversial issue by ascertaining economic gains in the Northern Metropolis. This uplift likely stems from expectations of future building upgrades, skilled labor influxes, and increased amenity levels (Hornbeck and Keniston, 2017).

place-based policies for other cities seeking to address regional inequality and boost economic opportunities. Our results are specifically insightful for cities situated within larger geographic/economic zones (e.g., European Union, San Francisco Bay Area, Greater Bay Area) or those undergoing structural evolution by embracing IT innovations and drawing in skilled labor (e.g., Mumbai, Kigali, Dublin).

Methods

Data Sources

Our analysis draws on data from several sources. First, housing transaction data for Hong Kong is obtained from EPRC Ltd., a widely used and esteemed reservoir of housing transaction data. The dataset contains transaction-level details such as transaction price, date, buyer and seller names, property address, building age, floor level, saleable floor area, and the number of rooms. We define the Northern Metropolis area as comprising the North and Yuen Long districts, two of Hong Kong's eighteen districts, as highlighted in red in Appendix Figure A2.

Second, we use deal-level online consumption records from HKTV Mall, the leading online shopping platform in Hong Kong. This dataset spans June 2021 to February 2022 and contains 4,686,504 observations.[9] Unlike traditional Census data that are low frequency (e.g., every 10 years) and not viable for evaluating short-term policy effects, the HKTV Mall dataset provides a high-frequency, granular perspective of consumption behaviour. It includes buyer ID, order amount, order date, delivery area, and building name. Importantly, HKTV Mall also catalogs the housing type (private or public) associated with each transaction, allowing us to examine how consumption

[9] According to an online retail survey from Frost & Sullivan in 2021, the HKTV Mall leads the online retail landscape in Hong Kong with a commanding 13.9 percent market share. Its closest competitor, PARKnSHOP, lags significantly, holding a market share of merely 2.4 percent of the market, showcasing HKTV Mall's dominance.

behaviour varies by housing segment—including public housing, which typically lacks market price data due to resale restrictions.

Third, we obtain district-level demographic data from the Hong Kong Census and Statistics Department, including the ratio of population aged 15+ holding a post-secondary degree (*Ratio_University*), the number of households with a monthly income exceeding 30,000 HKD (*Higher-income households*), and the number of households with two or more family members (*Households with Larger Family Sizes*). School enrolment and operating classes data are obtained from the Hong Kong Education Bureau, including grade-specific enrolment and classes at the district level.

Lastly, Shenzhen housing transaction data comes from a proprietary database and contains variables similar to those in the EPRC dataset, including transaction price, date, property address, building age, floor level, unit size, and elevator availability. To examine cross-border spillovers, we define Shenzhen's bordering area as the five subdistricts adjacent to the Northern Metropolis area: Yuehai, Nantou, Futian, Fubao, and Huangbei.

Models

In this Section, we present the empirical models employed in our analysis. We first implement a DiD strategy, treating the North and Yuen Long districts as the treatment group and the remaining sixteen districts as the control group. We begin with a symmetric nine-month window around the announcement of the policy in October 2021 (i.e., [-4 months, +4 months]) and later extend the window to one year on either side (i.e., [-12 months, +12 months]) to estimate the longer-term effect. Our baseline regression is:

$$Log(Housing\ Price)_{it} = \alpha + \beta_1 Policy_t * North_i + \gamma H_{it} + \varphi_t + \omega_i + \theta_{it} + \varepsilon_{it} \quad (1)$$

where the dependent variable, $Log(Housing\ Price)_{it}$, represents the logarithm of the housing transaction price in million HKD for housing unit *i* at time *t*. The main variable of interest is the DiD

estimator, $Policy_t * North_i$, where $Policy_t$ indicates transactions post-October 2021 (i.e., after the announcement), and $North_i$ equals 1 if the property is located within the Northern Metropolis area and 0 otherwise. The coefficient β_1 thus gauges the nuanced differential in housing prices within the Northern Metropolis post-announcement.

H_{it} encompasses a vector of housing characteristics, including building age, floor, and unit size. φ_t is the year-month fixed effect, ω_i represents the district fixed effect, and θ_{it} is the year-month-by-region fixed effect. ε_{it} denotes the error term. Standard errors are clustered at the year-month and district levels.

In Hong Kong, a single building typically contains multiple individual housing units (flats). To better capture the intensive margin, we use monthly building-level aggregated transaction amounts as our outcome variable to examine whether the Northern Metropolis policy stimulated transaction activity in the area. Our regression is specified as follows:

$$Log(Aggregated\ Transaction\ Amount)_{bt} = \alpha + \beta_1 Policy_t * North_b + \varphi_t + \omega_b + \theta_{bt} + \varepsilon_{bt} \quad (2)$$

where the dependent variable, $Log(Aggregated\ Transaction\ Amount)_{bt}$, represents the logarithm of the building-month level transaction amount at building b at time t. The rest of the model specifications follow Equation (1), including controls for year-month fixed effects (φ_t), district fixed effects (ω_b), and year-month-by-region fixed effects (θ_{bt}). Standard errors are clustered at the district levels.

Next, we examine the impact of the Northern Metropolis policy on consumption behavior. Unlike the housing transaction data, the HKTV Mall dataset captures consumer spending across all housing types. We categorize private houses, private apartments, and private village houses as private housing, and group housing under the Home Ownership Scheme (HOS) and public rental housing as public housing. This allows for a nuanced examination of the policy's impact on various types of residences. Our empirical model can be expressed as follows:

$$Log(Order-level\ Online\ Shopping\ Amount)_{jt} = \alpha + \beta_1 Policy_t * North_j + \varphi_t + \omega_j + \theta_{jt} + \mu_j + \varepsilon_{jt} \quad (3)$$

where the dependent variable, $Log(Order-level\ Online\ Shopping\ Amount)_{jt}$, is the logarithm of total amount of an order j in time t. The coefficient β_1 captures the consumption changes in the Northern Metropolis area post-announcement. We also add customer fixed effects (μ_j) to control unobserved, time-invariant factors at the customer level. Other variables and parameters are the same as in Equation (1). Standard errors are clustered at the year-month, district, and customer levels.

Our third analysis pertains to the policy's impact on demographic shifts within the Northern Metropolis area post-announcement. Specifically, we scrutinize the demographic trends from 2017 to 2023 spanning education level, household income level, household size, and school enrolment. The empirical model is expressed as follows:

$$Log(Demographic)_{dt} = \alpha + \beta_1 Policy_t * North_d + \beta_2 Policy_t * Outskirt_d + \beta_3 Log(HHincome)_{dt} + \varphi_t + \omega_d + \varepsilon_{dt} \quad (4)$$

where the dependent variable $Log(Demographic)_{dt}$ is defined as the logarithm of the following annual district-level demographic variables: *Ratio_University*, *Higher-income households*, *Households with Larger Family Sizes, Total Enrolment* and *Total Classes*. $Outskirt_d$ is a dummy variable that equals one if it is within the New Territories but not within the Northern Metropolis area and 0 otherwise. $Log(HHincome)_{dt}$ is the logarithm of median monthly household income of economically active households (excluding foreign domestic helpers) in HKD. The coefficient β_1 gauges the variations in demographic changes within the Northern Metropolis area after the policy's introduction. Fixed effects pertaining to year and district are included. Other variables and parameters are the same as in Equation (1). Standard errors are clustered at the district levels.

Last, we investigate the policy's impact on housing prices in Shenzhen's bordering area. The treatment group includes five subdistricts bordering Hong Kong (Yuehai, Nantou, Futian, Fubao, and Huangbei), while all remaining subdistricts within Nanshan, Futian and Luohu districts serve as the

control group. Consistent with the estimation of Equation (1), we use [-4 months, +4 months] for short-term effects and [-12 months, +12 months] for longer-term effects. Our regression is specified as below:

$$Log(Housing\ Price)_{it} = \alpha + \beta_1 Policy_t * Border_i + \gamma H_{it} + \varphi_t + \omega_i + \theta_{it} + \varepsilon_{it} \quad (5)$$

where the dependent variable, $Log(Housing\ Price)_{it}$, represents the logarithm of the housing transaction price in million CNY for housing unit *i* at time *t*. The interaction term, $Policy_t * Border_i$, captures post-announcement changes in housing prices for properties in Shenzhen's bordering area. Similar to Equation (1), H_{it} encompasses a set of housing characteristics. φ_t is the year-month fixed effect, ω_i represents the subdistrict fixed effect, and θ_{it} is the year-month-by-district fixed effect. ε_{it} denotes the error term. Standard errors are clustered at the year-month and district levels.

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