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COVID-19 pandemic and the Philippine real estate property cycle: indications of bubble and burst in the "new normal"?

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The Philippines has been one of the countries greatly affected by the COVID-19 pandemic. The country is regarded to be under the world's longest lockdown with an upsurge of cases, and it has also entered into an official recession with record-breaking economic contraction and high unemployment rates, fueling economic uncertainties. These macroeconomic indicators show serious signs of the adversities of the pandemic affecting the real estate development sector. As the real estate sector recalibrates its plans on response, recovery, and resiliency, this paper attempts to provide empirical evidence on the celebrated model in real estate economics proposed by Homer Hoyt and later developed by Glenn R. Mueller: the property cycle. We also provide contextualization on the property cycle empirics under the pandemic, given the sector's reintroduction of the Real Estate Investment Trust (REIT). We argue that the REIT mainly supports the real estate development industry given the adversities of the pandemic and its accompanying recession, as well as an update to the long-term plans of the industry and its players in compliance with the "new normal".

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1. Introduction

The Philippines is one of the countries of the world that is significantly affected by the COVID-19 pandemic. The first two quarters of 2020 indicated contraction, signaling an official recession after the Asian Financial Crisis (AFC), worst in the history of its national income accounts [Abueg 2020a]. The recent release of the first quarter macroeconomic indicators of 2021 showed a negative economic growth at -4.2 percent [Philippine Statistics Authority 2021] and remaining to be of the lowest performance relative to counterparts in Southeast Asia [Punongbayan 2021]. In addition to the pandemic struggle of infection containment, the last quarter of 2020 experienced several typhoons that severely affected much of Luzon Island. These natural disasters[1] have contributed to further problems of economic recovery as well as the containment of infections, as affected residents flock into limited spaces designated as evacuation centers. Such limitations in spaces defy the health protocols of physical distancing set forth by the government, and strains the supply of clean and potable water which are essential for sanitation. The series of typhoons also contributed to damages in public infrastructure and agriculture, further depleting the public coffers given the continued efforts of pandemic response.

Given these events, the fourth quarter of 2020 indicated dismal economic figures which has grave consequences in the short run as many scholars have projected. The pandemic (plus other factors) would have probably affected the track of the property cycle in the case of the real estate sector in the Philippines. Incidentally, the "reintroduction" and possible hype of the Real Estate Investment Trust (REIT) during the pandemic months is one of the possible attempts of the players in the sector to keep the real estate initiatives economically afloat and viable.

It is then the aim of this paper to provide empirical evidence on the real property cycle through providing an econometric model given the real estate sector data recorded in the Philippines, as well as to provide an avenue for academic discourse and discussion on the floated worries of some industry players regarding the possibility of the existence of a bubble. This is not an easy task, as it can be recalled from the global experiences and the lessons learned from both the AFC in 1997-99 and the Global Financial Crisis (GFC) in 2007-09. While the Philippines is always on the better side of the GFC learning from the lessons of AFC [Dacanay et al. 2018], the pandemic is a different story as the recession is not induced by economic origin [Abueg 2020a]. It is also important to note that a review done by Mayer [2011] stated that "existing research does not

[1] Note that prior to the pandemic, the year 2020 began with the eruption of the Taal volcano in Batangas, Philippines. Although the effects of the eruption are felt significantly in nearby towns and provinces, it may have also affected the macroeconomy in the first quarter of 2020. Moreover, exactly a week after the aftermath of the Typhon Ulysses (with international name Vamco), the National Disaster Risk Reduction and Management Council estimates that the series of typhoons have caused at least ₱10.1 billion—both in agriculture and infrastructure in the regions of Luzon [CNN Philippines 2020].

yet provide a crisp definition of a housing bubble nor does it allow researchers to predict where or when bubbles can occur". Such absence of a precise and agreed definition further complicates the analysis, and also provides additional debate on the subject matter.

However, we have to emphasize that during the onset of the pandemic, macroeconomic data may have triggered such a property cycle to manifest, as suggested earlier. More particularly, given that the economic sectors are adapting to the "new normal", we highlight economic measures and policies that may remain relevant to the real estate sector in particular (e.g., REIT), and the macroeconomy in general. The current conditions of the pandemic may have fueled uncertainties in modelling, predicting and forecasting property cycles, bubbles, and bursts as noted in the earlier pre-pandemic work of Mayer [2011]. Note that such models of the property cycle by Hoyt [1933], Mueller [1999; 2002] worked on non-pandemic-induced recessions and largely on data from the United States. Given the trends indicated from date reported in Correa and Abueg [2020], we follow these seminal works and motivate the discussion with an attempt to do econometric modelling. We also take into account the pandemic effects in the Philippine case.

2. Methodology

We begin the analysis using macroeconomic data and health-related indicators of the pandemic, guided by the discussion set forth in Correa and Abueg [2020]. We use the data series from official reports provided by the Philippine Statistics Authority (PSA) for economic indicators, and the Department of Health for pandemic-related indicators. A total of 92 quarters will be covered in the empirical tests, beginning from the first quarter of 1998 (1998q1) to the fourth quarter of 2020 (2020q4). To utilize data on quarters prior to year 2000, we used backcasting methods introduced in the Handbook of Backcasting [UN Statistics Division 2018], and guided by official growth rates of the period. We use data covering the post-AFC period, including GFC and the current pandemic-induced recession.

Given that the REIT Act was ratified in 2009 through Republic Act (RA) no. 9856 [Official Gazette of the Philippines 2009] we discuss the timeliness of the revived "hype" of the real sector in investment and trust funds, given that the pandemic-causing economic recession has severely affected incomes of households, profits of businesses, and even the tax revenues of the government. These in turn have serious consequences on loans and mortgage payments that are rolled-out during the years immediately preceding the pandemic [BusinessWorld 2020a]. While it is arguable that the industry players' decision to participate in REIT offerings may be largely based on business motives, it is important to provide some discussion on how industry players perceive this revival attempt

given the current health and economic conditions. However, given that the REIT introduction by players is a developing initiative, the paper can only suggest possible influence of the presence of REIT given the law's ratification in 2009, and its revival in 2020. Data regarding real estate companies offering or planning to offer REITs are derived mainly from mainstream media sources via local business news reports and company disclosures. Note, we were also constrained by the lack of a central repository for real estate industry-related data detailing specific and standardized metrics of different facets of the market (e.g., number of newly-built homes according to government-mandated categories, current vacancy and occupancy rates) as well by the non-disclosure policy of real estate industry players concerning other market-related real estate data (aside from date sets required by the government via the PSA). Notwithstanding these limitations, we attempt to describe current real estate market developments and to explain possible repercussions of such developments.

After the presentation of macroeconomic and health indicators as well as the plans and pursuits of the real estate sector, we provide econometric modelling of the property cycle. This aims to provide statistical evidence of the cycle in the Philippine setting, as the indications suggested by Correa and Abueg [2020]. Notably, the second quarter of 2020 has shown the worst performance of the Philippine economy in terms of economic growth and employment, showing a significant indication of such cycle. Given that the paper utilizes only official national data reported by the PSA, we only focus on the financial aspect of the property cycle. Note that early work on property cycles were proposed by Hoyt [1933], with empirical developments provided by Mueller [1999; 2002][2].

Given the attempt to model the property cycle for the Philippines considering the data indications, we state some of the hypotheses surrounding the model. First, the discrepancy between the physical and financial property cycles by Mueller [1999; 2002] suggests an autoregressive process of order 2 (i.e., an AR (2) process) given the sector's recorded gross value added (GVA). Second, we posit that the pandemic may have influenced the decline in the real estate development sector's GVA through the gross domestic product (GDP). The econometric models will also utilize related specifications from other related literature, since the paper is a first attempt to model the property cycle using recorded official GVA data of the sector.

[2] The two-quarter lag is suggested by Mueller [1999] and Mueller [2002] due to the difference in the physical property cycle (the volume of real estate investments), and the financial property cycle (the market value of real estate investments transacted in the economy).

3. Macroeconomics of real estate and the pandemic

3.1. Macroeconomic indicators and the pandemic

The Philippines is one of the top countries of the world in terms of total number of COVID-19 cases and total active COVID-19 cases (net of deaths and recoveries). The extended lockdown in Metro Manila as the epicenter also caused the record-breaking lows of economic growth: four quarters of negative growth of real GDP, with the second quarter at -16.9 percent. This second quarter economic contraction officially brought the country into recession, worse than the recession due to the Asian Financial Crisis, and the lowest since 1946. Additionally, the second quarter of 2020 (given the April Labor force Survey report) registered a record high of 17.7 percent unemployment rate, the highest since its first recording in 1987. While there is an improvement in July (at 10.0 percent unemployment rate), underemployment rate remains significantly high, the unemployment metric quite relevant to the Philippines as a developing country [Abueg 2020b]. Note that annual growth for 2020 was at -9.5 percent, lower than the 1983-85 crisis of the Marcos regime, also the lowest since 1946. To date, the first quarter of 2021 recorded -4.2 percent GDP growth, which is the fifth straight quarter under the pandemic and in a recession. This is midway to the nine quarters of negative GDP growth during the 1983-85 recession.

While there was a 16.51 percent quarter-on-quarter growth in GDP for the fourth quarter of 2020, it is due to two reasons. First, there was gradual reopening of some parts of the country in lieu of the holidays. Second, the low starting value of the GDP in the third quarter exhibits the "base effect" [Abueg 2020b]. Details of the quarterly reports are provided in Table 1 below.

TABLE 1. Real GDP growth rates

Real GDP growth, quarterly	**2020q1**	**2020q2**	**2020q3**	**2020q4**
Year-on-year	-0.7 (r)	-16.9 (r)	-11.4 (r)	-8.3 (p)
Quarter-on-quarter (nsa)	-15.86	-6.62	0.20	16.51
Real GDP growth, annual	**2019**	6.0 (r)		
	2020	-9.5 (p)		

Legend: p = preliminary, r = revised, nsa = not seasonally adjusted.
Sources of data: Data from PSA, with quarter-on-quarter growth rates from author's calculations.

Construction consistently and increasingly contributes to economic contraction, and by the third quarter, the real estate development sector placed in the top three sectors that contribute to negative economic growth (in Table 2). This is despite the rallying program of the national government beginning 2017 to double-time and intensify public infrastructure creation, dubbed as "Build Build Build".

Suzara et al. [2020] has also shown that apart from the downward revisions to infrastructure spending targets, the Department of Public Works and Highways data show significant amounts of underspending. They have also shown that pre-pandemic data calculations of contributions of public infrastructure spending did not—and was not able to—support the construction sector to propel the economy to desired growth rates and realize a "golden age of infrastructure".

TABLE 2. Real GDP growth rates, and contributions to decline (expenditure side)

Real GDP growth	**2020q1**	**Real GDP growth**	**2020q2**
Year-on-year	**-0.7**	**Year-on-year**	**-16.9**
Change in inventories	-3.6	Manufacturing	-3.9
Durable equipment	-0.6	Construction	-2.5
Construction	-0.5	Transportation & storage	-2.5
Real GDP growth	**2020q3**	**Real GDP growth**	**2020q4**
Year-on-year	**-11.4**	**Year-on-year**	**-8.3**
Construction	-3.3	Household final consumption expenditure	-5.7
Real estate & ownership of dwellings	-1.6	Construction	-4.9
Manufacturing	-1.6	Durable equipment	-2.3

Notes: Construction highlighted to emphasize as consistent (and increasing contribution) to GDP decline in 2020.
Source of data: PSA.

3.2. Updating the real estate sector profile

The real estate development industry has indicated remarkable success in the last decade owing to the big contributions of the real estate component of the industry. This is indicated in the boom of the increase in available office spaces (especially for business processing outsourcing or BPOs), new developments in residential areas (especially outside Metro Manila), and new sites for economic zones. Additionally, the predominantly consumerist economy of the Philippine economy which enabled the proliferation of commercial centers and shopping malls—called the "mall culture" [Rico and de Leon 2017]—has expanded into the development of mall complexes, which include office spaces and residential areas whether vertical (condominiums) or horizontal (subdivisions) dwellings. Trends are reflected in Figure1, Figure 2, and Figure 3, which are updated versions of those reported in Correa and Abueg [2020].

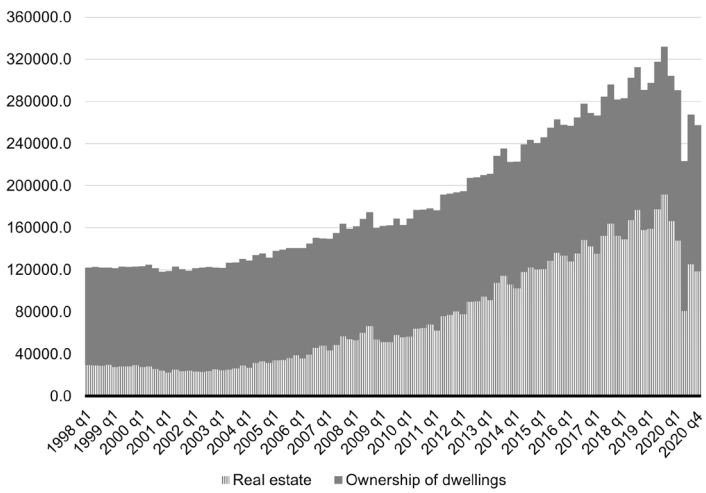
In the Philippines the real estate development industry has three components: real estate development (RE), ownership of dwellings (OD), and renting and other business related-activities (RBA). While the RBA subsector has contributed

significantly also to the industry, the RE subsector and GDP growth rates have been moving positively, as correlation tests suggest [Correa and Abueg 2020]. The RBA component has also garnered significant increases in the last years due to the increase in foreign nationals residing in the Philippines for work, school, or business endeavors. For instance, before 2015, there has been an increase in Korean nationals who go for business investments, or education, among other reasons. Later years witnessed the influx of Chinese mainlanders to work in offshore gaming operations in the country.

Between the RE and OD subsectors, RE is the more volatile component of the total industry, which may be considered riskier in terms of investments in the sector. Nonetheless, as in Figure 1 and Figure 2, RE subsector is the driving component of growth of the whole industry. We also present an updated profile of GDP versus the RE and OD subsectors in Figure 3. This is in contrast to OD, where growth is relatively stable, and that this demand is arguably guaranteed by the increasing population. Thus, OD is a safer haven of the industry relative to RE. It is also noteworthy to mention that despite the perceived relationship of housing demand to population growth, data suggests a weak negative correlation between these variables [Correa and Abueg 2020].

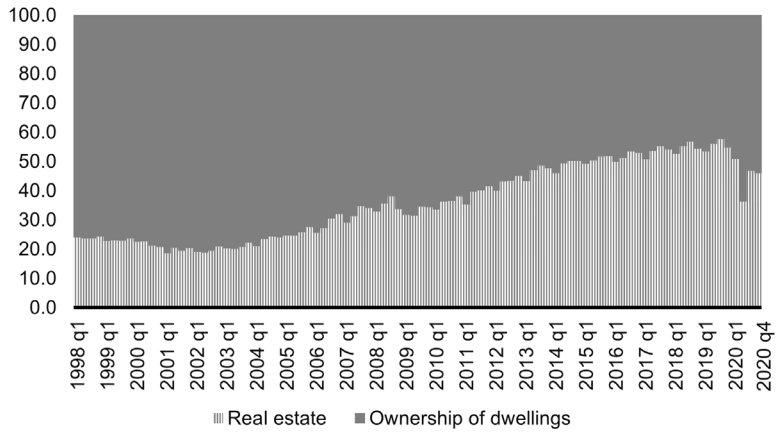
The behavior of the real estate development industry in the last 23 years indicates boom-and-bust under certain macroeconomic conditions. Given the pandemic and the recession, it is appropriate to consider such discussion in light of the historical experiences given AFC and GFC (which are driven by property bubble bursts). Because of the "mall culture", BPOs, and other developments in the economy, there has been a continued increase in real estate development in the last years. And then the pandemic came, which led the economy to the "new normal".

FIGURE 1. GVA of the real-estate sector in 2018 prices, 1998q1-2020q4



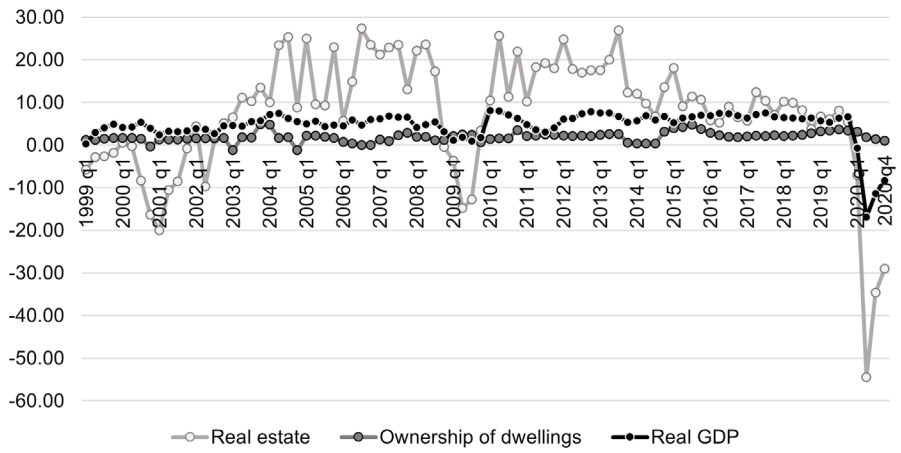
Notes: Quarters prior to 2000 are back casted using official growth rates.
Source: Data from PSA.

FIGURE 2. Share of real estate development and ownership of dwellings as subsectors, to total real estate development sector GVA, 1998q1-2020q4



Notes: Quarters prior to 2000 are back casted using official growth rates.
Source: Data from PSA.

FIGURE 3. Growth of real estate development and ownership of dwellings subsectors, and real GDP growth, 1999q1-2020q4

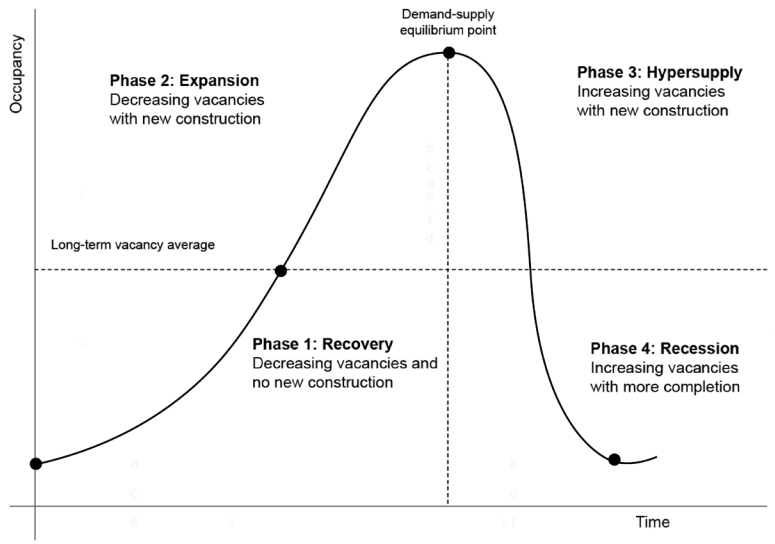


Source: Data from PSA.

3.3. The property cycle and property bubble

In real estate economics, a model that appropriately describes the behavior of real estate development is the property cycle. (Hoyt [1933], Mueller [1999], Mueller [2002]), as shown in Figure 4.

FIGURE 4. The property cycle



Note: Adapted by Correa and Abueg [2020], from Mueller [1999; 2002].

The COVID-19 pandemic that dampened economy in 2020 also affected the real estate development sector. Given the relationship of the sector's growth and economic growth, the pandemic may have triggered an early transition from phase 2 (expansion) to phase 3 (hypersupply) of the property cycle. These are also suggested in official data in Figure 1 and Figure 2. The early transition is further exacerbated with the losses and damages incurred in the aftermath of the series of typhoons that struck the country in October and November. Note that while the epicenter of the pandemic is Metro Manila (the National Capital Region), it is also the top contributing region in terms of value-added for the macroeconomy, together with Central Luzon (Region 3) and CALABARZON (Region 4A). These regions are also significantly affected by the typhoons, which compounds the economic hardships brought forth by the pandemic.

In addition, Mueller [1999] and Mueller [2002] estimate an eighteen-year period to complete a whole property cycle, with at least two quarters lag for the effects to be realized (that is, a difference between the physical and the financial property cycles). In the case of the Philippine real estate development sector, a possible manifestation of this may be found in Table 2, where the sector emerged as second highest contributor to the economic recession. Although this is not

isolated, construction (a related sector) has shown consistent and increasing contributions to economic contraction in 2020. Even in pre-pandemic quarters, public infrastructure expenditure programs did not aid in propelling growth in the economy [Suzara et al. 2020].

Industry players have floated various measures for keeping the sector resilient and responsive to the "new normal". One is to adapt investment and trust funds to keep capital resources flowing into the sector. Dubbed as the REIT, it aims to establish investment funds to support endeavors in the real estate development sector. While REIT is similar to the trust funds and investment funds of financial institutions (e.g., banks and investment houses), REIT aims to provide ample support, especially now when the sector faces significant challenges: the pandemic and the aftermath of natural disasters.

With the recession at hand, industry players and analysts fear of a "bursting of a property bubble", that is, the hype of expansion during the years prior to the pandemic will be countered by a sharp expansion/contraction of the sector. Note that the trend in GVA in the real estate may be a basis for a number of industry players to say that the rise in GVA during the pre-pandemic quarters is a development of a property bubble, and the decline during the pandemic quarters may suggest a property bubble burst. The recession has even induced uncertainty among lenders in financial institutions: as incomes are greatly reduced (domestic and foreign), risks of defaulting on property loans are becoming more and more probable [Abueg 2020a]. This is even supported by trends in business and consumer survey reports of the Bangko Sentral ng Pilipinas (BSP), despite the central bank successively reducing its rates for monetary policy. This is despite the fact that legislation has ordered moratorium on charging interests on loans through Republic Act (RA) Nos. 11469 and 11494[3], and also extended deadlines to those affected by the pandemic, whether health-related or due to economic reasons [Abueg 2020a].

While there are empirical indications in the data reflected in Figure 1 and Figure 2 relative to the property cycle in Figure 4, the decline in gross value added (GVA) of both RE and OD subsectors do not necessarily reflect a bubble burst or even a real estate bubble in the first place. Nonetheless, speculation of a bubble previously present and its possible burst cannot be dismissed given the continuous increase in demand in real estate development and infrastructure from local housing demand, commercial and office spaces development, as well as the demand from migrants and long-staying tourists in the last decade. As mentioned, this indication of a significant decrease in the reflected GVA data of the industry (coming from a steady increase during the pre-pandemic years) fueled

[3] RA no. 11469 is dubbed as "Bayanihan To Heal As One Act", while RA no. 11494 is titled as "Bayanihan To Recover As One Act". The themes of the legislation are coming from the idea insinuated in the 2019 Southeast Asian Games the, "We Win As One". The word "bayanihan" denotes community collectivity or communal unity, a trait which is ingrained to Philippine culture. To date, a proposed sequel law is in Philippine Congress, which if enacted, will be known as "Bayanihan to Rebuild As One Act", or "Bayanihan 3" [Abueg 2020b].

speculations of the presence and bursting of the property bubble. This demand on real estate development in the years prior to the pandemic is supported by external demand coming from foreign nationals staying in the country for longer periods.

As the country continues to grapple with the effects of the pandemic, so does the real estate development industry and its subsectors. The booming industry prior to the pandemic is hoped to be sustained or at least kept afloat even in the pandemic-induced recession. This paved the "reintroduction" and increased offering of the REIT by various players. In the next section, we provide a discussion of the REIT and context on a so-called revival, as well as documenting industry players' behavior towards this fund facility for the industry during the current health and economic crisis.

4. The revival of real estate investment trust

4.1. REIT, revisited

A REIT is a market investment facility (trust fund), which is generally a corporation listed in the stock market that owns or manages income-producing real estate. A REIT can own and operate various real estate assets such as residential properties, commercial or retail buildings, office spaces, hospitals, hotels, resorts, and warehouses. Some countries even allow REITs to own and manage public infrastructure such as airports, seaports, land terminals, and tollways [National Tax Research Center 2017]. One unique facet of investing in REITs is their potential for high-yield dividend growth as they are required by law to pay out 90 percent of their income to stockholders, typically paying higher dividends compared to other equities [Likos 2020]. Add to this the advantage of favorable returns as hedge for inflation and easier liquidity, holding REIT shares allows an investor to earn a share of real-estate produced income without exposure to the risks associated with ownership and development of real property.

REIT in the Philippines was made possible by the enactment of the Real Estate Investment Trust Law or RA no. 9856 back in 2009 [Official Gazette of the Philippines 2009]. The law's proponents envisioned for all Filipinos to be able to build and protect their wealth by investing in the ownership of income-generating real estate in the country, with lawmakers also looking to tap into the real estate market as a source of further economic growth and development in the capital markets as evident in successful REIT offerings in countries with mature markets such as Hong Kong, Japan, and Singapore. The idea of introducing REIT in the Philippines was presented via a house bill in Congress as early as July 2007, but the bill took two years before it became a law. At that time, countries were reeling from the GFC that ironically was ignited by subprime mortgage debt causing a real estate bubble [Dehesh and Pugh 2020]. With the signing of the law, the government expected to generate more tax income with this new

investment vehicle. Despite providing real estate developers a cheaper source of funding and liquidity in the capital markets, real estate industry stakeholders rejected participating in REIT supposedly due to regulatory impositions. In particular, The Securities and Exchange Commission (SEC) in its issuance of the law's implementing rules and regulations in 2010 then revised in 2011, mandated that on the first year of the REIT's listing public ownership should be at least 40 percent, and then raised up further until the third year. Also in 2011, the Bureau of Internal Revenue (BIR) imposed a 12-percent value-added tax rate on transfer of properties to REITs [Securities and Exchange Commission 2020]. Despite the vision of the law to open up the economy for further investments, it took more than a decade before an actual REIT company was listed in the Philippine Stock Exchange (PSE) and only after the SEC and BIR relaxed their imposed regulations last January 2020. This relaxation of the rules enabled the country to welcome its first ever REIT in the third quarter of 2020.

As the Philippines' first REIT to be listed in the PSE, AREIT, Inc. is 45 percent owned by the public and 54 percent owned by its sponsor Ayala Land Inc., one of the biggest real estate developers in the country. AREIT currently has five properties in its portfolio of real property assets namely: Mckinley Exchange Corporate Center, Ayala North Exchange (ANEx), Solaris One, Teleperformance Cebu, and the 30th Corporate Center [AREIT Inc. 2016] Generally, the real estate asset classes of all five properties revolve around mixed-use developments with emphasis on office, retail and hotel use situated in the Philippines' major central business district (CBD) areas.

After its listing date on August 13, 2020, AREIT shares dropped and closed at 7.78 percent lower than its initial public offering (IPO) price of ₱27.00 which was already lower than its indicative pre-IPO price of ₱30.05 [Almazan, 2020]. Despite the economic uncertainties during the onset of the COVID-19 pandemic, the AREIT's IPO was nonetheless oversubscribed by twice the base offer—implying healthy interest by investors [BusinessWorld 2020b]. The performance of AREIT may be viewed in Table 3.

Interestingly a week after AREIT's listing, other major local real estate players expressed keen interest following suit, including Double Dragon Properties, Vista Land Inc., and Robinsons Land Inc. While these corporations have announced plans to offer their respective REITs as of January 2021, they have yet to formally launch their respective REITs perhaps postponing their plans until market conditions become favorable or due to some commercial or legal considerations. [Reyes 2021]. Although a lot of real estate developers are enticed to offer their own REIT IPOs, not all industry players wish to participate in REITs. We have provided in the appendix a table showing companies that offered and/or are planning to offer REITs. It can be deduced that large-capital real estate companies in the Philippines mainly view REIT offerings as an opportunity to bolster their finances during the pandemic.

TABLE 3. AREIT's asset portfolio in terms of real estate asset class and geographic location

Asset Class	During IPO (2020)	2021	Change
Office (%)	86	87	1
Hotel (%)	7	6	-1
Retail (%)	7	7	0
Total revenue (₱ billion)	2.16	2.64	0.48

Location	During IPO (2020)	2021	Change
Makati City (%)	89	62	-27
Cebu City (%)	11	7	-4
Pasig City (%)	0	31	31
Gross land area (sqm)	170,848	245,819	74,971

Note: Changes are authors' calculations.
Sources of data: Data from disclosed data in report by ABS-CBN [2020].

4.2. Challenges in Philippine real estate market amidst the pandemic

The COVID-19 pandemic has greatly affected the Philippines' real estate market especially the residential condominium sector located in central business districts (CBDs). The majority of owners of such residential properties are overseas Filipino workers who struggle to pay or risk defaulting on their mortgage payments [Dass 2020]. This contributes to the tightening of banks' lending to capital borrowers including that for home loans [Lucas 2021]. Tourism-related property assets are experiencing a period of major decline due to strict quarantine measures imposed by the government since March 2020. While office spaces remain the bulk of the property inventory located in CBDs within Metro Manila, there is a question of whether tenants of such properties can still afford to fulfill their obligations under their lease agreements—especially that of fulfilling mid- to long-term lease contract duration typically observed in office rentals and yearly rent escalation clauses. The shift to work-from-home (WFH) and telecommuting work set-ups for employees has also lessened the demand for such office spaces, not to mention the exodus of online casinos stationed in various residential towers in Metro Manila [BusinessWorld 2020c]. With both residential and office tenants dwindling, mall operators are now dealing with the highest vacancy rates in retail leasing since the AFC with rental rates expected to continue to decline until 2021 as malls suffer a 30-50 percent drop in retail foot traffic [BusinessWorld 2020d]. It is interesting to note that aside from one property in AREIT's portfolio (ANEx) that has yet to achieve full mixed-use tenant occupancy, its property portfolio consisting of hotels, retail and office spaces located in cities with high incidences of COVID-19 cases [Correa and Abueg 2020] could make astute investors wonder whether

AREIT can be profitable in these trying times for the real estate market. AREIT's prospectus states that the proceeds of its IPO and money generated from sale of income-generating real estate to AREIT will be used to fund its sponsor's ongoing and future real estate acquisitions within Metro Manila and other key regions in the Philippines [AREIT Inc. 2020]. This leads investors to conclude that AREIT's parent company will fund its capital acquisitions via equities instead of debt.

Industry pundits are generally pessimistic on the attractiveness of Philippine real estate as an investment this 2021, and real estate investors remain wary of COVID-19's impact on property values, occupancy rates, and all-around trade growth with some even skeptical of published demand for real properties during this recession observed in Southeast Asia. While REIT offers an attractive proposition of acquiring real estate assets without the hassle of owning actual real property, it is also subject to negative factors besetting real estate such as investment risks (e.g., deteriorating property values), interest rate hikes, and low overall market demand. Further, timing REIT offerings during the current pandemic begs the question of how the parent companies of these REITs are going to use the cash earned from this endeavor. Real estate operates in a cyclical manner heavily influenced by market or external forces; and with real estate investing being unattractive to investors during the pandemic, the general value proposition of REIT offerings in the country remains to be seen.

5. Modelling the property cycle

5.1. Model preliminaries and property cycle descriptive statistics

We begin the modelling of the cycle by providing descriptive statistics essential for the property cycle. Table 4 summarizes the real estate development sector from 1998q1 to 2020q4, which fairly indicates the property cycle by comparing Figure 4 with the trends indicated in Figure 1 and Figure 2. RE is growing 4 times relative to OD, and is twice the industry growth. This is despite RE's share being much lower than OD. As noted earlier, the use of official national data reports utilizes the financial property cycle for the econometric modelling.

TABLE 4. Authors' calculations of period averages of macroeconomic indicators

Indicator	Real Estate	Ownership of Dwellings	Industry Total
GVA in million ₱ (1998q1-2020q4)	76046.40	112927.75	188974.15
Percent growth (1999q1-2020q4)	7.54	1.94	3.66
Percent share to total gross value added (1998q1-2020q4)	36.14	63.86	100.00

Source of data: PSA.

5.2. Econometric model of the property cycle

Given the trends and observations in the indicated period, we formulate an autoregressive distributed lag – error correction model (ARDL-ECM) with p lags for the dependent variable y, q_1 lags for the regressor w, the squared term of GDP represented by w^2 to incorporate nonlinearity of the cycle with lags q_2, other weakly exogenous socioeconomic variables x_m with lags q_3, a vector of dummies $\boldsymbol{d}$ representing exogenous shocks or structural breaks, and the Hadamard product of $\boldsymbol{w}$ and $\boldsymbol{d}$ which represents the interaction terms of w and the structural breaks. This specification can be dynamically represented by Kripfganz and Schneider's [2018] conditional error correction form that is reparametrized at time t and is modified as follows:

$$\Delta y_t = (c_0 + c_1 t) - \alpha\left(y_{t-1} - \theta_1 w_t - \theta_2 w_t^2 - \vartheta x_t\right) + \sum_{i=1}^{p-1} \beta_{1i} \Delta y_{t-i} + \sum_{i=0}^{q_1-1} \beta_{2i} \Delta w_{t-i} + \sum_{i=0}^{q_2-1} \beta_{3i} \Delta w_{t-i}^2 + \sum_{\substack{m=1 \\ i=0}}^{q_3-1} \beta_{4i} \Delta x_{m,t-i} + \boldsymbol{\Delta}\mathbf{D}^{\mathrm{T}}\boldsymbol{\phi} + \boldsymbol{\Delta}(\mathbf{w} \circ \mathbf{D})^{\mathrm{T}}\boldsymbol{\gamma} + \varepsilon_t \quad (1)$$

where

y_t = GVA of the real estate sector in quarter t
α = speed of adjustment to long-run equilibrium
y_{t-i} = GVA of the real estate sector in quarter $t - i$
θ_1, θ_2 = long-run coefficients of w_t and w_t^2
ϑ = vector of long-run coefficients of variables x_m
w_t = GDP growth rate (year-on-year) in quarter t
w_{t-i} = GDP growth rate (year-on-year) in quarter t - i
w_t^2 = Squared of GDP growth (year-on-year) in quarter t
w_{t-1}^2 = Squared of GDP growth (year-on-year) in quarter t-i
x_{1t} = average non-performing loans ratio (nplratio)for quarter t
x_{2t} = average inflation rate (π) for quarter t
x_{3t} = average overnight reverse repurchase rate (RRP) for quarter t
D_{09} = dummy variable for 2009q1 to 2019q4
D_{20} = dummy variable for 2020q1 to 2020 q4
$w \cdot D_{09}$ = interaction term between GDP growth (year-on-year) and D_{09}
$w \cdot D_{20}$ = interaction term between GDP growth (year-on-year) and D_{20}

The statistical significance of GDP growth and its squared level will then indicate the existence of a real property cycle in the Philippines. The above model will also allow us to estimate not only the short-run coefficients of the regressors but also their long-run effects, especially of GDP growth and its squared level. We also included the inflation rate to account for general level of prices in the economy, which may influence the accrued GVA of the sector. Also, given the nature of payments on loans and mortgages, we include the country's monetary policy given by the reverse repurchase payments (or RRP) by the Banko Sentral ng Pilipinas (BSP). And given that there are risks to default in the real estate sector and related markets, we incorporate in the model the rate of nonperforming loans (NPLs). In the Philippines, real estate mortgages and loans influence the increase (or decrease) in NPLs as influenced by the state of the macroeconomy.

The other variables included are suggested by or similar to those in the literature on real estate research, particularly those of property insurance and premiums (e.g., [Michael and Zhao 2016]; [Choi, Hardigree and Thistle 2002]). We also considered a previous work on the real estate development sector's GVA by Simbre [2019][4]. We also included two dummy variables: D_{09} to account for post-GFC and coincident with the enactment of RA No. 9586 (REIT law). Another dummy variable D_{20} accounts for the pandemic-induced recession and is coincident with the re-introduction of REIT by industry players. It is hypothesized that 2009 and 2020 are possible breaks in respective timebound data given economic conditions affecting the real estate sector in particular, and the macroeconomy in general.

There are also indications of correlation provided in Correa and Abueg [2020] on output growth and growth in real estate, and population growth and growth in ownership of dwellings. These argue for pursuing a more elaborate econometric model that will estimate the property cycle in the Philippines.

The literature suggests steps that must be taken prior to the estimation of our ARDL-ECM[5].

[4] The paper by Simbre [2019] proposed an empirical work on the real estate development sector using annual data and working only on pairwise correlations of three particular variables. This is cited in Correa and Abueg [2020] that the former is inadequate to claim empirical analysis owing to the studied variables and nature of data. In addition, the latter criticized the former for drawing arguments on the sector and policy prescriptions without adequately providing data and analysis.

[5] First, we need to determine the order of integration $I(n)$ of each variable using the augmented Dickey-Fuller (ADF) test, DFGLS test, and Phillips-Perron (PP) test. Second, if all variables have the same $I(n)$, then we can check the existence of a long-run relationship among them using Johansen and Juselius [1990] cointegration test. Otherwise, if they are a mix of $I(0)$ and $I(1)$ such that no variable is $I(2)$, then we can employ a more flexible cointegration test developed by Pesaran, Shin, and Smith (2001). This approach nonetheless requires the model to pass both the F- and t-tests to reject the null hypothesis of no cointegration. Such occurs when the model's F- and t-statistics are greater than the $I(1)$ bounds determined at least at the 5 percent level of significance for each distribution. If test statistics fall within the $I(0)$ and $I(1)$ bounds identified by the test, then we cannot draw a conclusion on the existence of a long-run relationship between the dependent variable and its covariates. This test uses the Kripfganz and Schneider's [2018] estimation.

The next step is to ascertain the existence and direction of Granger causality between the said variables using an alternative test developed by Toda and Yamamoto [1995][6], requiring a vector autoregressive (VAR) estimation given by the system

$$y_t = \psi_0 + \sum_{i=1}^{p'+m'} \psi_{1i} y_{t-i} + \sum_{i=1}^{p'+m'} \psi_{2i} w_{t-i} + \sum_{i=1}^{p'+m'} \psi_{3i} x_{1,t-i} + \sum_{i=1}^{p'+m'} \psi_{4i} x_{2,t-i} + \sum_{i=1}^{p'+m'} \psi_{5i} x_{3,t-i} + \epsilon_{1t} \quad (2)$$

$$w_t = \varphi_0 + \sum_{i=1}^{p'+m'} \varphi_{1i} w_{t-i} + \sum_{i=1}^{p'+m'} \varphi_{2i} y_{t-i} + \sum_{i=1}^{p'+m'} \varphi_{3i} x_{1,t-i} + \sum_{i=1}^{p'+m'} \varphi_{4i} x_{2,t-i} + \sum_{i=1}^{p'+m'} \varphi_{5i} x_{3,t-i} + \epsilon_{2t} \quad (3)$$

$$x_{1t} = \omega_0 + \sum_{i=1}^{p'+m'} \omega_{1i} x_{1,t-i} + \sum_{i=1}^{p'+m'} \omega_{2i} y_{t-i} + \sum_{i=1}^{p'+m'} \omega_{3i} w_{t-i} + \sum_{i=1}^{p'+m'} \omega_{4i} x_{2,t-i} + \sum_{i=1}^{p'+m'} \omega_{5i} x_{3,t-i} + \epsilon_{3t} \quad (4)$$

$$x_{2t} = v_0 + \sum_{i=1}^{p'+m'} v_{1i} x_{2,t-i} + \sum_{i=1}^{p'+m'} v_{2i} y_{t-i} + \sum_{i=1}^{p'+m'} v_{3i} w_{t-i} + \sum_{i=1}^{p'+m'} v_{4i} x_{1,t-i} + \sum_{i=1}^{p'+m'} v_{5i} x_{3,t-i} + \epsilon_{4t} \quad (5)$$

$$x_{3t} = \mu_0 + \sum_{i=1}^{p'+m'} \mu_{1i} x_{3,t-i} + \sum_{i=1}^{p'+m'} \mu_{2i} y_{t-i} + \sum_{i=1}^{p'+m'} \mu_{3i} w_{t-i} + \sum_{i=1}^{p'+m'} \mu_{4i} x_{1,t-i} + \sum_{i=1}^{p'+m'} \mu_{5i} x_{2,t-i} + \epsilon_{5t} \quad (6)$$

where p' is the maximum number of lags for the model as determined by Akaike information criterion (AIC); and m' is either equal to 1 if variables are a mix of $I(0)$ and $I(1)$, or equal to 2 if they are a mix of $I(1)$ and $I(2)$. If the model is found to be autocorrelated, then we must increase p' until such problem is resolved. We will then test the significance of the coefficients of p' lags for each regressor using Wald test. Rejection of the null hypothesis implies Granger causality between the dependent and independent variables considered.

Finally, we will estimate Equation (1) above using OLS and Kripfganz and Schneider's [2018] ARDL-ECM approach. Those variables found to be non-cointegrated with y_t will be treated as exogenous variables affecting short run dynamics. The significance and specification of the model will also be checked using F-test and Ramsey RESET test, and a series of diagnostics on the residuals will be conducted using Jarque-Bera test for normality, Durbin's alternative test for serial autocorrelation, Cook-Weisberg test for heteroscedasticity, and ARCHLM test for conditional autoregressive heteroscedasticity.

[6] Toda and Yamamoto's [1995] approach is very desirable as it does not require all variables to be of the same order of integration and/or be cointegrated.

5.3. Empirical results

Tables A1 and A2 (in the appendix) present the results of our unit root tests for levels and first differences with the intercept and/or trend included. At least two-unit root tests on the first differences confirmed that all variables are $I(1)$, except for the squared level of GDP growth which was found to be $I(0)$.

Given those findings and that no variable is $I(2)$, we proceeded with Pesaran, Shin and Smith's [2001] bounds test for cointegration since the Johansen-Juselius test is not applicable due to such mixture of $I(n)$. The results of the bounds test are shown in Table A3 and Table A4 in the appendix. We first conducted the test on three versions of y, i.e., its level form, natural log form, and growth rates. On one hand, it was found that the level form is not cointegrated and suffers from misspecification error or omitted variable bias (or even both). On the other hand, no valid conclusion can be drawn on the existence of a long-run relationship when the log form is used. Finally, the bounds test indicated that a long-run relationship exists between y_t and its regressors when its year-on-year growth rate ($\hat{y}$) is considered. No specification error was found with the $\hat{y}$-version, and all diagnostic tests indicated that the residuals are normally distributed, non-serially correlated, and homoscedastic.

The results of the bounds test on the regressors are also reported in Table A3 and Table A4 in the appendix. However, given the finding that only the $\hat{y}$-specification yields a statistically significant long-run relationship, we decided to exclude the level and logarithmic forms of real estate GVA in the subsequent models. Among the independent variables, only GDP growth rate (w) and inflation rate (π) were found to be cointegrated with their respective regressors. No long-run relationship is found when testing the *nplratio* with the rest of the variables; whereas the test failed to draw a conclusion when we considered the RRP-specification. Moreover, these last two models did not yield normally distributed and homoscedastic residuals, in addition to the *nplratio*-model being mis-specified.

We then performed Toda and Yamamoto's [1995] test for Granger causality on the VAR models, which also served as a verification on the findings of the bounds test. As reported in Table 5 below, we found that GDP growth rate Granger causes the growth rate of real estate GVA, but not the other way around. Hence, there is only a unidirectional long-run relationship between GDP growth and real estate GVA growth, which is indicative of a possible real property cycle in the Philippines. The test also pinpointed a unidirectional link between inflation (π) and the overnight RRP. One may recall that RRP is one of the primary monetary policy tools used by the BSP in carrying out its task of stabilizing prices in the country. Hence, the test may lend support on the effectiveness of RRP in bringing about long run impacts to inflation levels. Finally, the test also confirmed the results of the bounds test that no significant long-run relationship exists when *nplratio* and *rrp* are taken as endogenous variables respectively.

TABLE 5. Test for Granger causality

Independent Variables	$\hat{y}$	w	*nplratio*	π	*rrp*
$\hat{y}$	-	0.93	3.60	2.41	0.70
w	10.10**	-	1.82	0.78	1.84
nplratio	0.11	1.09	-	1.13	0.75
π	2.63	0.35	0.90	-	5.10
rrp	0.29	0.70	1.56	7.31*	-

Notes: The symbols *, ** indicate significance at α=5% and α=1% respectively. All figures reported are χ^2-statistics.

To provide empirical evidence of a real property cycle in the Philippines, we ran four estimations of the proposed model shown by Equation (1). We first ran an OLS regression as a consistency check to the main ARDL-ECM estimation (ARDL-ECM1). The latter is further treated with two additional versions namely ARDL-ECM2 and ARDL-ECM3. The former incorporates the dummies D_{09} and $w \cdot D_{09}$ to account for the drift and trend created by the post-GFC economy and the enactment of RA No. 9586 (REIT law). The latter adds the dummies D_{20} and $w \cdot D_{20}$ to ARDL-ECM2 to account for the structural break arising from the onset of the COVID-19 global pandemic. Table 6 presents the results of these regressions.

Except for ARDL-ECM2, AIC's selection of an AR (2) structure on real estate GVA growth concurs with the findings in Mueller [1999; 2002]. Those studies suggested that there is a lag of two quarters between the physical and financial property cycle. Additionally, as real estate investors and buyers incorporate insurance and premiums in pricing of real property and related investments, empirical evidence also suggest this AR (2) process in property insurance and premiums (e.g., Choi, Hardigree and Thistle [2002], in China). This supports the trends observed by Mueller [1999; 2002] using US data, supporting the earlier work of Hoyt [1933].

As reported in Table 6, all four regressions found that the coefficients of the level and squared of GDP growth rates are statistically significant at the 5 percent level . The estimates thus indicated that there is an inverted-U relationship between real estate GVA growth and GDP growth, which validates the existence of a real property cycle in the country. From the marginal effects of GDP reported in Table 7, we see that a one-percentage point increase in GDP growth rate can increase the real estate GVA growth by about 0.43-0.86 percentage point in the short run. Long-run marginal effects further showed that a similar percentage point increase in GDP growth could translate to about 0.81-1.2 percentage points increase in real estate GVA growth.

TABLE 6. OLS and ARDL-ECM Regressions

	OLS	ARDL-ECM1	ARDL-ECM2	ARDL-ECM3
Optimal lag structure	(2,1,0,0)	(2,1,0,0)	(2,1,0,0)	(4,0,0,0)
		Long Run Effects		
ADJ	-0.5290**	-0.5302**	-0.5697**	-0.7217**
w	1.4389**	1.4340**	1.5808**	3.2126**
w^2	-0.0668**	-0.0664**	-0.0614*	-0.0993**
π	-0.0111	-0.0211	-0.1076	-0.1295
		Short Run Effects		
$\Delta\hat{y}_{t\text{-}1}$	-0.1551*	-0.1538*	-0.1496*	-0.0441
Δw_t	0.4109*	0.4147*	0.3612	
$nplratio$	0.0186	0.0172	-0.0447	-0.0887
rrp	-0.4307	-0.4126	-0.5519*	-0.5901*
D_{09}			-0.9732	0.5540
$w{\cdot}D_{09}$			-0.1109	-0.3675
D_{20}				-2.6607
$w{\cdot}D_{20}$				-3.4306**
$\Delta y_{t\text{-}2}$				0.1226
$\Delta y_{t\text{-}3}$				0.2144
Constant	1.8351	1.7917	3.4501*	0.8798
		F**-tests**		
R^2	0.7343	0.7350	0.7445	0.7706
Adjusted R^2	0.7067	0.7068	0.7095	0.7281
F-statistic	26.60**	11.084**	11.553**	18.767**
Ramsey RESET test	1.26	1.17	0.48	0.01
		χ^2**-tests on Residuals**		
Jarque-Bera test	1.17	1.24	1.58	0.79
Durbin's Alt test	0.29	0.249	0.045	0.47
Cook-Weisberg test	0.05	0.03	0.16	0.21
ARCHLM test	0.151	0.090	0.242	2.12

Notes: The symbols *, ** indicate significance at α=5% and α=1% respectively and with respect to $I(1)$ bounds for F-statistic in ARDL-ECM. The optimal lag length is determined by Akaike information criterion. Figures reported under χ^2-tests are the χ^2-statistics.

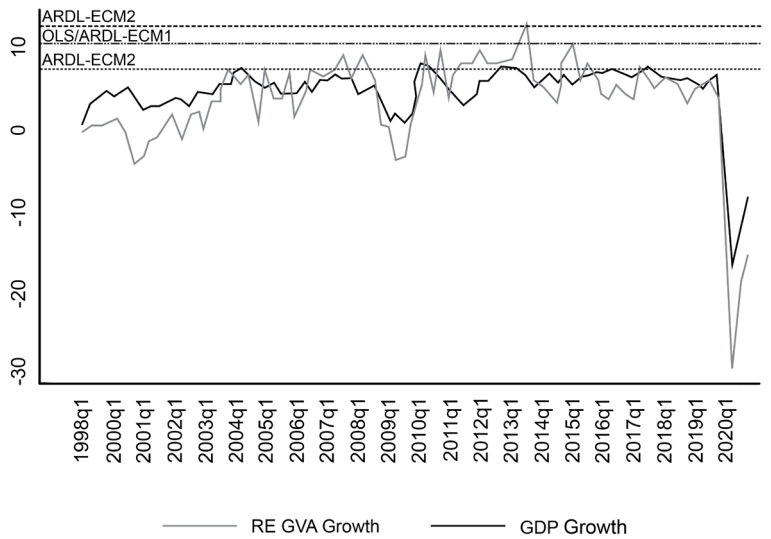
TABLE 7. Marginal effects of GDP growth on real estate GVA growth

	OLS	ARDL-ECM1	ARDL-ECM2	ARDL-ECM3
Long Run $[=\theta_1\text{-}2\theta_2\cdot E(w)]$	0. 8133**	0.8117**	1.0059*	1.1970*
Short Run $[=(\theta_1/\alpha)\text{-}2(\theta_2/\alpha)\cdot E(w)]$	0.4303*	0.4304*	0.5730	0.8639*
Turning Point $[=\theta_1/(2\theta_2)]$	10.78**	10.80*	12.88	7.47**

Notes: The symbols *, ** indicate significance at α=5% and α=1% respectively. The mean value of GDP growth $E(w)$, which is equal to 4.6858%, is used in computing the marginal effects. The statistical significance of each estimate is checked using Wald test.

Disregarding the structural breaks, the peak of the cycle seems to occur when the GDP growth rate reaches 10.8 percent, although such figure was never recorded in any of the quarters under study. A more plausible estimate of the turning point emerged when we incorporated the dummies for both the post-GFC and the global pandemic. ARDL-ECM3 advances that the peak of the cycle occurred when the year-on-year GDP growth reached 7.47 percent. These turning points are visualized in Figure 5, which emphasizes that the latter critical value is the most plausible one to produce the turning point given the data.

FIGURE 5. Estimated Critical Values of GDP Growth Rates



Except for GDP growth, only the coefficients of the reverse repurchase rate and the interaction term $w\cdot D_{20}$ turned out to be significant at 5 percent, especially when the structural breaks are accounted in the model. According to those models, the RRP has a short-run negative relationship with real estate GVA growth, which is possibly linked with inflation. Also, we note that the RRP is the BSP's monetary

policy serving as a benchmark for short-term market interest rates and this would have a more direct effect of the growth in real estate GVA than inflation. In the model, we estimated that a percentage point increase in RRP could lead to about 0.55 to 0.59 percentage point decrease in real estate GVA growth. Ultimately, the statistical significance of the interaction term $w{\cdot}D_{20}$ highlights the degree of the trend-reversing effect of the pandemic on the real estate GVA growth via the GDP growth. The reflected 1 percent level of significance and the relative high magnitude of the negative coefficient highlights the impact of the GDP growths in the quarters of the pandemic in 2020 relative to the considered time horizon of the model (given 92 quarters of data). Additionally, the non-significance of the same dummy as a standalone regressor (i.e., not interacted with other regressors) means that the year per se is irrelevant to the variability of the GVA of the real estate development sector. Such finding may then support the conjecture of many of the industry players that the perceived property bubble in the country burst during the onset of the COVID-19 pandemic, triggering a transition from phase 2 (expansion) to phase 3 (hypersupply)—if not to phase 4 (recession), which is influenced by the macroeconomic conditions as reflected by economic growth rates.

6. Conclusions

The study endeavors to provide empirical evidence on the real property cycle in the Philippines during the period 1998-2020, which data suggests an AR (2) process, consistent with observations of Mueller [1999; 2002] of Hoyt [1933]. This paper also aims to provide an avenue for academic discourse and discussion on the floated worries of some industry players regarding the the presence of the property bubble and its concurrent bursting. It examines the dynamic causal relationship between the year-on-year growth of real estate industry GVA, the GDP year-on-year growth, overnight reverse repurchase rate, inflation rate, and other variables. Using Pesaran, Shin and Smith's [2001] bounds test for cointegration and Toda and Yamamoto [1995] test for Granger causality, findings confirm that there is a long-run unidirectional relationship running from GDP growth to real estate GVA growth and from overnight reverse repurchase rate to inflation rate. The latter may then lend support on the effectiveness of rr as a primary monetary policy tool of the BSP in bringing about long run impacts to inflation levels.

OLS and ARDL-ECM regressions emphasize a long-run inverted-U relationship between GDP growth and real estate GVA growth, indicating the existence of a real property cycle in the Philippines during the period under study. When the structural breaks for post-GFC and the enactment of RA No. 9586 (REIT law) and for the global pandemic are accounted in the model, the study found that the turning point of the cycle occurs when the GDP attains a year-on-year growth of 7.47 percent. Results also show that RRP negatively affects the real estate GVA growth in the short run. The pandemic is also found to have a trend-reversing

effect on the real estate GVA growth via the GDP growth, supporting the conjecture that the property bubble in the country may have existed prior to the pandemic, and burst during its onset.

In relation to these perceptions of the industry players and the trends shown by macroeconomic data, industry players have resorted to revive the REIT to keep the industry afloat via capital infusion given the circumstances of the pandemic-induced recession. While the industry demand shows promising trends during the years prior to the pandemic, the REIT may also aid to prevent further adverse effects to the industry players as the country still grapples its way out of the economic contraction. Not only is there an oversupply of real estate property owing to exit of offshore gambling operators, weaker demand also contributes to the problem as unemployment rates made historical high records [BusinessWorld 2020a; BusinessWorld 2020c]. As such, the existing mortgages are at risk of default, which creates a lot of speculation on the state of the country's financial institutions [Noble 2021; Dass 2002]. This is supported by the BSP's report on the increase in non-performing loans [BusinessWorld 2021]. Despite the fact that between RE and OD, the OD is a safe haven of the real estate development industry [Correa and Abueg 2020], but is significantly affected by the economic contraction.

Note that not only housing demand is affected due to the decrease in offshore gaming interests in the country, but also the retail and commerce activity due to the continued lockdown and mobility restrictions. This is even highlighted by the fact the increase in shopping mall vacancies are already close to the levels seen during the AFC [BusinessWorld 2020d]. This will greatly affect the economy (as shown by the macroeconomic indicators during the last five quarters of the pandemic), given the predominantly consumerist base of the macroeconomy [Rico and de Leon 2017].

Noting that REIT is an initiative coming from real estate development industry players, such must be complemented by sound macroeconomic policies that are related to sectors working with this sector (e.g., financial institutions, and government agencies aiding people to securefunds for mortgage and loan payments). The complementation of such policies are drawn from the results of the suggested econometric model. This way, adverse effects of the pandemic and the accompanying recession will be mitigated; and prevent some degree of contagion with financial institutions, consumer and retail sectors, and other economic sectors that work with the real estate especially in this time of the pandemic.

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Appendix

TABLE A1. Unit-Root tests for levels

	ADF Test		DFGLS Test[a]		PP Test[b]	
Variables	**Intercept**	**Intercept and Trend**	**Intercept**	**Intercept and Trend**	**Intercept**	**Intercept and Trend**
y	-0.435(5)	-2.126(5)	-0.218(4)	-1.621(4)	-0.677(15)	-2.793(15)
$ln(y)$	-0.988(5)	-1.882(5)	-0.035(4)	-1.508(4)	-0.588(11)	-2.822(11)
$\hat{y}$	-2.199(1)	-2.021(1)	-1.881(1)	-2.054(1)	-2.604(9)	-2.438(9)
w	-1.537(1)	-0.904(2)	-2.131(1)	-2.534(1)	-2.080(20)	-1.983(20)
w^2	-4.506(1)**	-5.643(1)**	-0.564(2)	-5.341(1)**	-6.841(20)**	-7.184(20)**
nplratio	-0.643(1)	-1.842(1)	-1.552(1)	-1.707(1)	-1.017(10)	-2.926(10)
π	-2.562(6)	-3.200(6)	-1.370(5)	-3.190(5)*	-2.064(20)	-2.110(20)
rrp	-2.425(1)	-3.673(1)*	0.758(2)	-1.734(2)	-2.112(12)	-2.519(12)

Notes: The symbols *, ** indicate significance at α=5% and α=1% respectively. The figures reported in parentheses are the number of lags which was determined using Schwarz's Bayesian information criterion for ADT and DFGLS, while those of PP Test was determined by automatic bandwidth selection to Newey-West using Bartlett kernel. The figures under PP test columns are the estimates of Z(t).

TABLE A2. Unit-Root tests for first differences

	ADF Test		DFGLS Test[a]		PP Test[b]	
Variables	**Intercept**	**Intercept and Trend**	**Intercept**	**Intercept and Trend**	**Intercept**	**Intercept and Trend**
y	-3.216(4)**	-2.981(4)	-3.301(3)**	-3.327(3)*	-11.938(20)**	-11.884(20)**
$ln(y)$	-2.482(4)	-2.235(4)	-3.396(3)**	-3.449(3)*	-12.100(20)**	-12.012(20)**
$\hat{y}$	-10.550(0)**	-10.650(0)**	-6.624(1)**	-7.043(1)**	-11.510(20)**	-12.934(20)**
w	-8.248(0)**	-8.304(0)**	-0.785(3)	-6.923(1)**	-8.544(20)**	-8.961(20)**
w^2	-4.758(2)**	-4.825(2)**	-9.807(1)**	-2.750(2)	-29.592(20)**	-29.944(20)**
nplratio	-10.260(0)**	-10.192(0)**	-0.751(3)	-1.344(4)	-10.361(10)**	-10.329(10)**
π	-4.821(5)**	-4.795(5)**	-1.532(4)	-2.963(4)	-5.502(20)**	-5.560(20)**
rrp	-7.827(0)**	-7.842(0)**	-3.473(2)**	-4.263(2)**	-8.148(20)**	-8.930(20)**

Notes: The symbols *, ** indicate significance at α=5% and α=1% respectively. The figures reported in parentheses are the number of lags which was determined using Schwarz's Bayesian information criterion for ADT and DFGLS, while those of PP Test was determined by automatic bandwidth selection to Newey-West using Bartlett kernel. The figures under PP test columns are the estimates of Z(t).

TABLE A3. Pesaran, Shin, and Smith's (2001) Bounds test for cointegration

Variables	y	$ln(y)$	$\hat{y}$
Optimal lag structure	(4,0,3,0,0,0)	(4,0,3,0,0,0)	(2,1,0,0,0,0)
		***F*-test**	
$I(0),I(1)$ Bounds			
At 1%		[3.657, 5.178]	[3.687, 5.141]
At 5%		[2.732, 4.028]	[2.760, 4.010]
R^2	0.9118	0.8560	0.7350
Adjusted R^2	0.8968	0.8317	0.7068
F-statistics	40.948**	25.248**	7.596**
Ramsey RESET test	4.08*	2.39	1.17
		***t*-test**	
$I(0),I(1)$ Bounds			
At 1%		[-3.486, -4.913]	[-3.498, -4.928]
At 5%		[-2.849, -4.199]	[-2.868, -4.226]
t-statistic	-0.384	-3.935	-4.868*
Decision	Accept H_0: not cointegrated	Inconclusive	Accept H_A: cointegrated
		χ^2-tests on Residuals	
Jarque-Bera test	1.54	2.30	1.24
Durbin's Alt test	2.005	2.032	0.249
Cook-Weisberg test	0.35	0.44	0.03
ARCHLM test	1.521	0.317	0.09

Notes: The symbols *, ** indicate significance at α=5% and α=1% respectively with respect to $I(1)$ bounds. The optimal lag length is determined by Akaike information criterion. Figures reported under χ^2-tests are the χ^2-statistics.

TABLE A4. Pesaran, Shin, and Smith's (2001) Bounds test for cointegration (other results)

Variables	w	$nplratio$	π	rrp
Optimal lag structure	(1,2,0,0,1)	(2,1,0,0,0,0)	(2,4,3,3,2,2)	(2,0,0,0,0,2)
		***F*-test**		
$I(0),I(1)$ Bounds				
At 1%	[4.026, 5.460]	[3.635, 5.206]	[3.591, 5.262]	[3.679, 5.150]
At 5%	[2.982, 4.213]	[2.712, 4.042]	[2.671, 4.069]	[2.753, 4.015]
R^2	0.6858	0.1625	0.6639	0.3264
Adjusted R^2	0.6523	0.0731	0.5501	0.2444
F-statistics	5.298**	1.726	6.123**	3.302
Ramsey RESET test	19.56**	8.68**	1.04	2.37

TABLE A4. Pesaran, Shin, and Smith's (2001) Bounds test for cointegration (continued)

		***t*-test**		
$I(0),I(1)$ Bounds				
At 1%	[-3.494, -4.691]	[-3.477, -4.901]	[-3.495, -4.879]	[-3.495, -4.924]
At 5%	[-2.868, -4.006]	[-2.835, -4.179]	[-2. 806, -4.138]	[-2.864, -4.220]
t-statistic	-5.037**	-2.557	-5.398**	-3.573
Decision	Accept H_A: cointegrated	Accept H_0: not cointegrated	Accept H_A: cointegrated	Inconclusive
		χ^2-tests on Residuals		
Jarque-Bera test	5.83	60.99**	3.17	46.73**
Durbin's Alt test	0.247	0.068	0.002	0.140
Cook-Weisberg test	5.43*	10.73	1.26	3.78
ARCHLM test	1.658	4.723*	0.000	9.894**

Notes: The symbols *, ** indicate significance at α=5% and α=1% respectively with respect to $I(1)$ bounds. The optimal lag length is determined by Akaike information criterion. Figures reported under χ^2-tests are the χ^2-statistics.

TABLE A5. Current and upcoming Philippine REITs (as of May 2021)

REIT Name	Projected IPO Value, in ₱ billion	Total Offered Shares for IPO	Listing Date in PSE	Price per Share on listing date, in ₱
Ayala Real Estate Investment Trust, Inc. (AREIT)[a]	13.500	502,570,000	Aug. 13, 2020	27.00
Double Dragon Meridian Park REIT (DDMP REIT)[b]	14.700	6,536,737,316	Mar. 24, 2021	2.25
RL Commercial REIT Inc. (RLC REIT)[c]	26.670	3,647,967,000	Aug. 31, 2021 to Sep. 6, 2021 (tentative)	7.31
Filinvest Land Inc. (FLI) via Cyberzone Properties Inc. (CPI)[d]	14.350	1,793,420,000	no data	8.30
Vista Land and Lifescapes (VLL)[e]	no data	no data	no data	no data

Disclosure sources and notes:
[a] https://ir.ayalaland.com.ph/wp-content/uploads/2020/09/Disclosure-2020-08-06-AREIT-Offer-Period-Completed-vF.pdf
[b] https://www.ddmpreit.com/invest/
[c] https://www.bworldonline.com/robinsons-land-unit-eyes-nearly-p27-billion-in-reit-market-listing/
[d] https://www.bworldonline.com/filinvest-land-unit-seeks-approval-for-reit-offering/
(This REIT listing has an application pending approval from regulatory agencies.)
[e] https://www.philstar.com/business/2021/05/11/2097253/vista-land-plans-reit-listing
(This company has expressed interest in offering a REIT but has yet to formally submit an application.)