Stock Market Betas for Cyclical and Defensive Sectors: A Practitioner's Perspective

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Companies can be categorized as cyclical or defensive based on their performance in various phases of the business cycle. Cyclical companies exhibit performance directly related to the business cycle, while defensive companies tend to display stability in the face of economic booms and busts. Given the link between earnings and stock price, as well as the stock market index as an indicator of the economic cycle, cyclical company stocks are commonly expected to exhibit returns highly correlated to the stock market index, while returns on defensive company stocks are generally believed to display low correlation to index returns. The above is especially useful in equity valuation, particularly in the use of the capital asset pricing model (CAPM) and the beta coefficient, where analysts typically perform valuation sense-checks on the beta variable – cyclical company stocks should generally have beta coefficients greater than 1, while defensive company stocks should generally have beta coefficients less than 1. Based on selected Philippine stock price data, the above sense-check holds true for defensive company stocks, while it does not hold true for cyclical company stocks.

1 Introduction

1.1 The Concept of Cyclical and Defensive Industries

Finance theory suggests that companies can be categorized based on their performance in various phases of the business cycle, particularly in expansions and recessions. **Cyclical companies** are firms that tend to depend on the business cycle for their performance. Cyclical firms are typically characterized by sales and earnings volatility as well as significant business risk, especially since product and/or service demand is affected by the current state of the economy. On the other hand, **defensive companies** are those companies which maintain stable performance in the face of business booms and busts. These companies are typically characterized by low business risk in the sense that the level of demand for their products and/or services is sustained, especially during economic downturns (Reilly & Brown, 2003).

1.2 Earnings as Key Driver to Stock Price Performance

It is generally accepted in the field of finance that a company's earnings power is a key driver of investment value, highlighted by the empirical research conducted by Ball & Brown (1968), which was recently replicated by Dechow, Sloan, and Zha (2014). Empirical research has shown that relative differences in the earnings power of firms, as measured by price-earnings ratios, are significantly related to long-run average stock returns. As such, in conjunction with the above discussion on cyclical and defensive industries, if a defensive company exhibits stable earnings throughout the business cycle, then that particular company's stock should also exhibit price stability. Furthermore, since stock market indices are generally representative of the economic conditions of a particular market, determining the sensitivity of a company's earnings to the business cycle is tantamount to determining the sensitivity of a company's stock price to a stock market index. Following the general logic of the above discussion, the returns on the stocks of defensive companies should reflect low correlation with the returns on the market index, which is characterized by a low stock market beta. Similarly, the returns on the stocks of cyclical companies should reflect high correlation with the returns on the market index, which is characterized by a high stock market beta.

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1.3   The GICS Sector Classification Methodology

The objective of the Global Industry Classification Standard (GICS), which was developed by S&P Dow Jones Indices and MSCI, is to help establish a standard analytical framework for investment analysis and portfolio management. Central to the appeal of GICS is its universality, with a classification methodology that is applied consistently across all companies worldwide. Such a well-defined, globally accepted system enables comparability of industry analyses and ease of performing relative valuation methods.

Generally, the GICS approach entails grouping companies under a specific sub-industry, which in turn belongs under broader industry, industry group, and finally, sector classifications. The initial sub-industry classification is assigned based on analysis of the company's primary business – which in turn is based mainly on understanding the business activities that generate majority of the company's revenues. While revenues are the chief determinant of the sub-industry assignment, earnings and market perception also factor into the classification methodology.

Other more specific GICS classification guidelines include: (1) when a company's revenue streams are split between or among two or more sub-industries, and no single sub-industry contributes at least 60% of revenues, the company is assigned to the sub-industry which contribute majority of both revenues and profits – and if no sub-industry contributes majority of both, further analysis is performed to determine a primary sub-industry; (2) when a company's revenue streams are diversified across three or more sectors, and no sector contributes majority of profits and/or revenues, the company will be assigned either to the Industrial Conglomerates sub-industry under the Industrials sector, or to the Multi-Sector Holdings sub-industry under the Financials sector; and (3) for new companies, classification is based on description of business activities and projected revenues and earnings from the prospectus.

An example of guideline (2) discussed above is Ayala Corporation (AC), which is assigned to the Multi-Sector Holdings sub-industry under the Financials sector given its diversified revenue stream from subsidiaries across several GICS sectors, such as Ayala Land (Real Estate), Bank of the Philippine Islands (Financials), Globe Telecom (Telecommunications), and Manila Water (Utilities), among others. The following charts break down AC's consolidated revenues and profits for the year 2016[1]:

Figure 1. 2016 Segment Revenue Share, Ayala Corp.
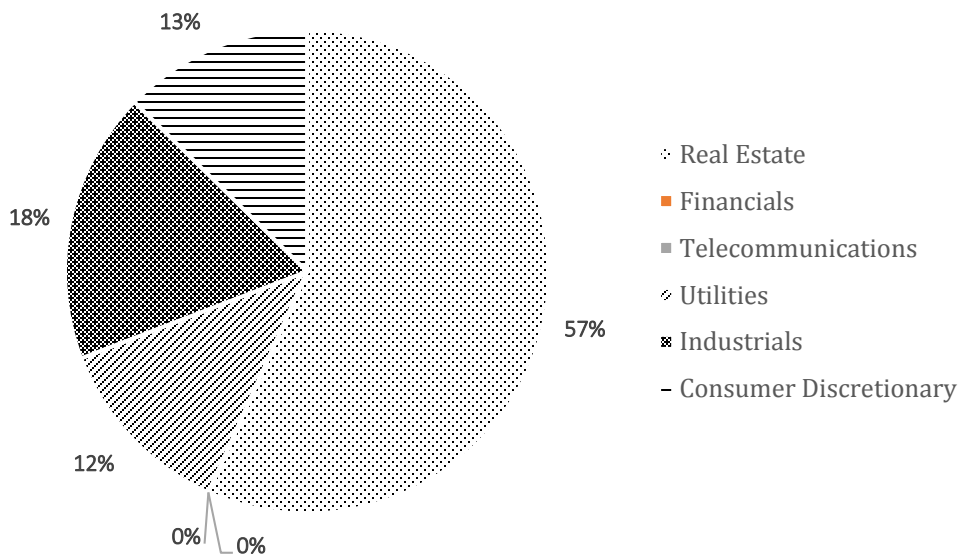
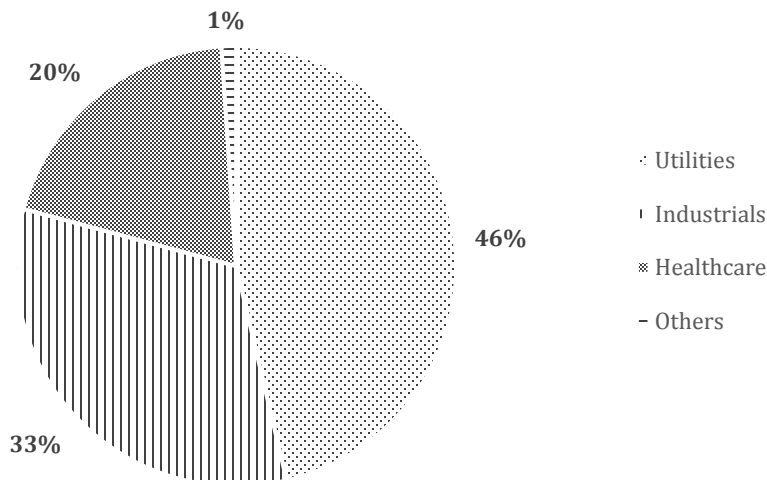[1] Ayala Corporation (2018). *2017 Annual Report (SEC Form 17-A)*.

Figure 2. 2016 Segment Profit Share, Ayala Corp.
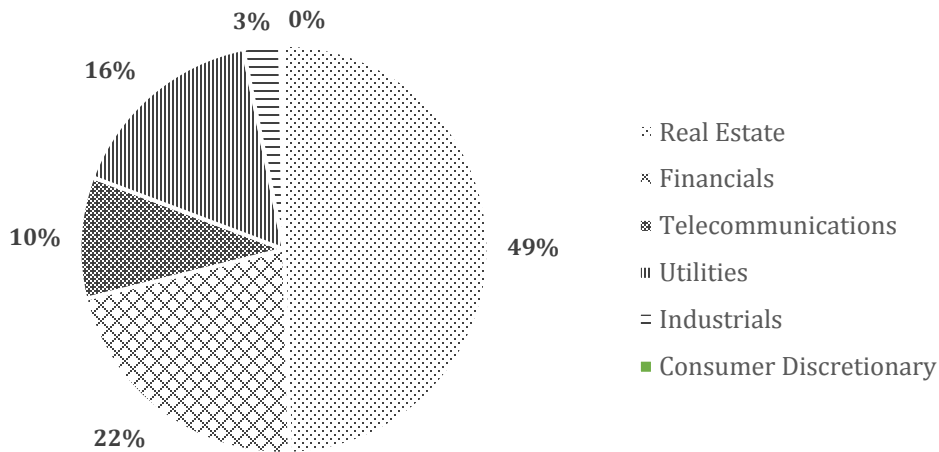
While AC derives majority (57%) of its revenues from the Real Estate sector via Ayala Land, no single sector contributes majority of the conglomerate's profits, as the Real Estate sector contributes the highest share at 49%. As such, AC is still classified under the Financials sector. Note that share in net earnings (losses) of associates is not included in revenues – hence the revenue contribution of nil from Financials and Telecommunications.

Another example is Metro Pacific Investments Corp. (MPIC), which is similarly classified as AC given its subsidiaries including Manila Electric Company, Global Business Power and Maynilad Water Services (Utilities), NLEX Corporation (Industrials), Makati Medical Center and Asian Hospital and Medical Center (Healthcare), among others. The following chart breaks down AC's consolidated revenues and profits for the year 2016[2]:

Figure 3. 2016 Segment Revenue Share, Metro Pacific Investments Corp.

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[2] Metro Pacific Investments Corporation (2018). *2017 Annual Report (SEC Form 17-A).*

Figure 4. 2016 Segment Profit Share, Metro Pacific Investments Corp.
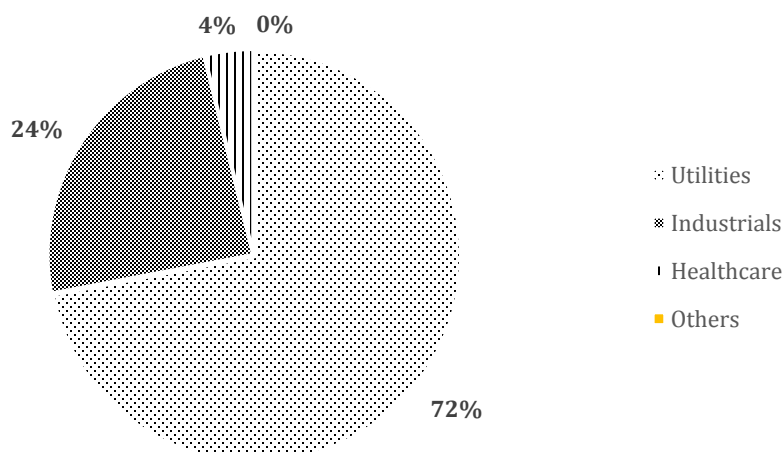
MPIC does not derive majority of its revenues from any single sector, with its Utilities businesses contributing 46% of revenues. Therefore, MPIC is still classified under the Financials sector, even as the Utilities sector contributes 72% of total profits after considering the share in net earnings (losses) of associates.

1.4   GICS Identification of Cyclical and Defensive Sectors

Using the GICS sector classifications, MSCI Barra developed a method for identifying cyclical and defensive sectors by measuring "the correlation between a sector's relative performance to the market and the year-on-year change in the leading economic indicator of the corresponding region," (Applied Research MSCI, 2009, p. 1) where the leading economic indicator used was the Organization for Economic Cooperation and Development's (OECD) Composite Leading Indicator (CLI) series. MSCI Barra (2009) posited that, relative to each sector's parent index (MSCI World/USA/Europe/Japan), the annual returns of each cyclical (defensive) sector is positively (negatively) correlated to the annual rate of change in the corresponding OECD-CLI. Long-run historical data from 1976 to 2009 was used in MSCI Barra's study.

The results of MSCI Barra's study show that the following sector indices (see Appendix A for GICS sector descriptions) exhibited cyclical behavior: Consumer Discretionary, Financials, Industrials, Information Technology, and Materials. On the other hand, the following sectors exhibited defensive behavior: Consumer Staples, Energy, Healthcare, Telecommunication Services, and Utilities. The Real Estate sector, while not technically included as an individual sector in MSCI Barra's 2009 study, is also classified as cyclical, having been carved out of the Financials sector and upgraded to its own separate sector last September 2016.

1.5   Cyclical/Defensive Sectors in Portfolio Management

Several research papers have acknowledged the role of cyclical/defensive investments in portfolio management. Novy-Marx (2016) noted the recent popularity of "defensive equity strategies", which overweight low-beta or defensive stocks and underweight high-beta or cyclical stocks. This investment strategy utilizes empirical research by Blitz and Van Vliet (2007) that pointed to low-volatility portfolios earning high risk-adjusted returns, as well as research by Baker, Bradley, and Wurgler (2011) that sought to explain the consistent underperformance of high-volatility/high-beta stocks versus low-volatility/low-beta stocks in the US market. Building on the above observations, Frazzini and Pedersen (2014) introduced an investment model using a "betting against beta" factor where high-beta stocks are shorted to effectively lever up investments in low-beta stocks, further highlighting the importance of identifying cyclical/defensive investments using estimated volatility/beta.

2   Objective

From a practitioner's perspective, equity valuation is both a science and an art. As such, it is always difficult to assess the accuracy or the precision of a stock's estimated value. In some cases, firms do not even choose to provide a single point estimate of a stock's value; rather, they provide a reasonable range of values that approximate the stock's price. In either case, whether a point estimate or a range of values is provided, the inherent inaccuracies in equity valuation necessitate a check of reasonableness to more or less validate the estimated value. In checking for the reasonableness of the estimate, equity analysts commonly perform sensitivity analysis on their inputs, such as cash flow forecasts and discount rates.

One of the most common sensitivity analyses performed by equity analysts is on the stock's beta, which affects stock price through its role in the derivation of the capital asset pricing model (CAPM)-based discount rate. Beta is the variable most commonly open to adjustments in the discount rate derivation since the other variables – the risk-free rate and the equity risk premium – can be readily identified and obtained from market data and empirical market studies, as well as through industry rules of thumb. On the other hand, there is no standard industry practice for obtaining beta, other than the use of regression analysis of the stock's returns against the relevant stock market index. Analysts can choose from various return frequencies (daily, weekly, monthly) as well as the historical period (normally 2-10 years) from which the historical returns are obtained in deriving beta. The varying methodologies can sometimes result in wildly fluctuating discount rates, and consequently, a wide range of equity values. This decreases the usefulness of the equity value analysis, especially in cases wherein acquirers request for valuations of their potential target companies in order to obtain a base value for negotiations.

In practice, a common way of validating the usefulness of the computed beta coefficient is to sense-check the obtained beta against the sector classification of the subject company. As discussed above, companies belonging in defensive sectors are usually regarded as low-beta stocks and should not be expected to have beta coefficients greater than 1. On the other hand, companies belonging in cyclical sectors are usually regarded as high-beta stocks and should not be expected to have beta coefficients less than 1.

The objective of the study is to validate the above practical test of reasonableness in the Philippine setting in order to aid equity analysts in estimating values for local stocks, and see whether such sense-check procedures can help mitigate wide-ranged equity valuations that end up not being useful in view of the purpose they were commissioned for in the first place.

3   Methodology

This paper aims to study the robustness of the practitioner's test of reasonableness in the Philippine setting through the following methodology:

1. Philippine stocks from various industries were selected and categorized under *Cyclical* and *Defensive*. Classification was done in accordance with the GICS, where each company was categorized in one of eleven industry sectors: Energy, Materials, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Financials (which includes diversified, multi-sectoral holding companies as part of its Diversified Financials industry group), Information Technology, Telecommunication Services, Utilities, and Real Estate. Each industry sector, in turn, was further classified as *Cyclical* or *Defensive* based on MSCI's Cyclical and Defensive Sectors Indices – where the Consumer Discretionary, Financials, Real Estate, Industrials, Information Technology, and Materials industry sectors are classified as *Cyclical* sectors, while the Consumer Staples, Energy, Health Care, Telecommunication Services, and Utilities industry sectors are classified as *Defensive* Sectors. A similar classification procedure was previously done by Bacmann, Dubois, and Isakov (2001), although such classification was based on indices from Datastream and FTSE instead of GICS and MSCI (Bacmann et al., 2001).

2. Monthly returns of selected Philippine stocks were computed from June 29, 2007 to June 30, 2017 (120 return observations). Monthly returns for certain stocks that only began trading after June 2007 were computed from the first available monthly return to June 2017. In

order to preserve the relative comparability with other stocks in terms of number of return observations, only stocks that started trading before June 2008 were included in this study. Furthermore, in order to minimize the potential understatement of return correlations that can arise due to lack of trading activity (Damodaran, 2002), stocks that exhibited zero trading activity for one month (i.e., 20 consecutive trading days) at any time from June 2007 to June 2017 were excluded from the study.

3. Monthly returns of the Philippine Stock Exchange Index were computed from June 29, 2007 to June 30, 2017.
4. Monthly returns of individual stocks were regressed against the monthly returns of the PSE Index in order to derive their respective equity betas.
5. To remove the effect of leverage on the beta coefficient, each stock's equity beta was unlevered using its debt-to-equity ratio as of June 2017, resulting in individual asset betas. The Hamada equation below was used in unlevering the equity betas to asset betas:

$$\beta_{asset} = \frac{\beta_{equity}}{\left[1 + (1 - t)\left(\frac{D}{E}\right)\right]} \tag{1}$$

Where t is the Philippine corporate tax rate of 30%; D is the book value of the company's financial debt, and E is the market value of the company's equity.

6. One-sample t-tests at 5% significance were performed on the resulting asset betas in order to determine whether the coefficients are significantly less than the market beta of 1.0 (for defensive companies) or significantly greater than the market beta of 1.0 (for cyclical companies).

4   Results of the Study

Based on the methodology discussed above, a total of 98 companies (see Appendix B for the full company names associated with the tickers listed in the table) were included in the study, with 73 companies belonging in Cyclical sectors and 25 companies belonging in Defensive sectors. The following tables summarize the results of the study:

Table 1. GICS Classifications for Selected Companies (see Appendix A for sector descriptions)

CYCLICAL COMPANIES (73)				DEFENSIVE COMPANIES (25)		
Consumer Discretionary (8)				*Consumer Staples (7)*		
ABS	GMA7	JFC	LOTO	COSCO	FOOD	GSMI
LR	PLC	WEB	WPI	PIP	RFM	URC
Financials (17)				VITA		
AC	APO	BDO	BKR	*Energy (7)*		
BPI	CEI	CHIB	COL	BSC	OPM	OV
LIHC	MBT	MPI	PNB	PCOR	PERC	PNX
PSE	RCB	SECB	UBP	SCC		
V						
Industrials (13)				*Telecommunication Services (2)*		
AEV	AGI	ANS	APC	GLO		TEL
DMC	EEI	ICT	IPM	*Utilities (9)*		
JGS	MAC	PAX	SM	ACR	AP	EDC
SMC				FGEN	FPH	LPZ
Information Technology (2)				MER	MWC	PHEN
GREEN		ISM				
Materials (14)						
APX	AR	AT	GEO			
HLCM	LC	MA	MARC			
NI	ORE	PX	T			
UPM	VUL					
Real Estate (19)						
ABA	ALI	BEL	BRN			
CHI	ELI	FDC	FLI			

CYCLICAL COMPANIES (73)				DEFENSIVE COMPANIES (25)		
GERI	MEG	MRC	OM			
RLC	RLT	SHNG	SLI			
SMPH	VLL	WIN				

Table 2. Computed Equity/Asset Betas for Cyclical Companies

CYCLICAL COMPANIES							
Ticker	Equity β	D/E	**Asset β**	Ticker	Equity β	D/E	**Asset β**
Consumer Discretionary							
ABS	0.73	0.57	**0.52**	LR	0.74	0.36	**0.59**
GMA7	0.73	0.03	**0.72**	PLC	1.33	0.00	**1.33**
JFC	0.69	0.05	**0.67**	WEB	0.56	0.00	**0.56**
LOTO	0.38	0.02	**0.38**	WPI	1.04	0.19	**0.92**
Financials							
AC	1.20	0.59	**0.85**	MBT	1.29	0.75	**0.85**
APO	0.66	0.00	**0.66**	MPI	1.24	0.49	**0.92**
BDO	1.15	0.17	**1.03**	PNB	1.55	0.54	**1.12**
BKR	0.44	0.96	**0.26**	PSE	1.32	0.00	**1.32**
BPI	0.83	0.15	**0.75**	RCB	1.20	0.98	**0.71**
CEI	1.22	0.00	**1.22**	SECB	1.07	1.42	**0.54**
CHIB	0.46	0.16	**0.41**	UBP	0.73	0.20	**0.64**
COL	1.07	0.00	**1.07**	V	0.62	0.10	**0.58**
LIHC	1.27	0.00	**1.27**				
Industrials							
AEV	0.66	0.60	**0.46**	IPM	1.13	0.02	**1.11**
AGI	1.64	1.06	**0.94**	JGS	1.81	0.39	**1.42**
ANS	0.64	0.15	**0.58**	MAC	0.39	0.02	**0.39**
APC	1.58	0.00	**1.58**	PAX	1.76	0.00	**1.76**
DMC	1.38	0.22	**1.20**	SM	1.13	0.35	**0.90**
EEI	1.95	0.38	**1.54**	SMC	0.41	2.78	**0.14**
ICT	1.31	0.01	**1.30**				
Information Technology							
GREEN	0.96	0.03	**0.94**	ISM	0.84	0.00	**0.84**
Materials							
APX	1.18	0.30	**0.97**	MARC	1.37	0.05	**1.33**
AR	0.84	0.00	**0.84**	NI	1.95	0.00	**1.95**
AT	1.59	2.93	**0.52**	ORE	1.96	0.00	**1.96**
GEO	1.45	0.00	**1.45**	PX	1.27	0.22	**1.10**
HLCM	1.11	0.00	**1.11**	T	1.12	0.81	**0.72**
LC	2.03	0.01	**2.01**	UPM	1.79	0.00	**1.79**
MA	1.42	0.00	**1.42**	VUL	0.71	0.00	**0.71**
Real Estate							
ABA	0.57	0.12	**0.53**	MRC	1.17	0.01	**1.16**
ALI	1.26	0.28	**1.06**	OM	1.15	0.00	**1.15**
BEL	1.10	0.23	**0.95**	RLC	1.39	0.43	**1.06**
BRN	0.63	0.70	**0.42**	RLT	1.28	0.06	**1.22**
CHI	0.84	0.65	**0.57**	SHNG	0.78	0.80	**0.50**
ELI	1.17	0.18	**1.04**	SLI	1.08	0.73	**0.72**
FDC	1.36	1.67	**0.63**	SMPH	0.73	0.18	**0.65**
FLI	1.55	1.33	**0.80**	VLL	1.64	1.08	**0.94**
GERI	1.39	0.37	**1.11**	WIN	0.67	0.00	**0.67**
MEG	1.94	0.53	**1.42**				

Table 3. Computed Equity/Asset Betas for Defensive Companies

				DEFENSIVE COMPANIES			
Ticker	Equity β	D/E	Asset β	Ticker	Equity β	D/E	Asset β
Consumer Staples							
COSCO	1.00	0.21	**0.88**	RFM	1.05	0.03	**1.03**
FOOD	0.40	0.01	**0.40**	URC	1.15	0.12	**1.07**
GSMI	0.62	1.75	**0.28**	VITA	0.77	0.00	**0.76**
PIP	1.28	0.33	**1.04**				
Energy							
BSC	0.83	0.00	**0.83**	PERC	0.66	0.04	**0.65**
OPM	1.03	0.00	**1.03**	PNX	1.01	1.07	**0.58**
OV	1.21	0.00	**1.21**	SCC	0.70	0.10	**0.65**
PCOR	0.38	1.86	**0.16**				
Telecommunication Services							
GLO	0.66	0.40	**0.52**	TEL	0.85	0.45	**0.65**
Utilities							
ACR	1.46	1.88	**0.63**	LPZ	1.69	4.87	**0.38**
AP	0.68	0.74	**0.45**	MER	1.08	0.14	**0.99**
EDC	0.96	0.61	**0.67**	MWC	0.63	0.56	**0.45**
FGEN	1.19	0.04	**1.16**	PHEN	1.05	0.73	**0.69**
FPH	1.25	4.18	**0.32**				

Table 4. One-Sample T-test Results for Cyclical and Defensive Betas (GICS-based)

	Cyclical Betas
Mean	0.95207
Variance	0.17290
Observations	73
Hypothesized Mean	1
df	72
t Stat	**(0.98489)**
P(T<=t) one-tail	0.16399
t Critical one-tail	**1.66629**

One-sample t-test for cyclical betas
$H_0: \beta_{asset} \leq 1$, $H_a: \beta_{asset} > 1$

Conclusion: DO NOT REJECT NULL
β_{asset} is not significantly > 1

	Defensive Betas
Mean	0.69953
Variance	0.08609
Observations	25
Hypothesized Mean	1
df	24
t Stat	**(5.12031)**
P(T<=t) one-tail	0.00002
t Critical one-tail	**(1.71088)**

One-sample t-test for defensive betas
$H_0: \beta_{asset} \geq 1$, $H_a: \beta_{asset} < 1$

Conclusion: REJECT NULL
β_{asset} is significantly < 1

5   Analysis of Results

5.1   Cyclical Companies

The computed mean asset beta (MAB) for cyclical companies was 0.95, with a variance of 0.17 and standard deviation of 0.42. Out of the six industry groups comprising the Cyclical industry sector, only the Materials (14 companies, MAB 1.28) and Industrials (13 companies, MAB 1.03) industry groups exhibited MABs greater than 1. The Information Technology (2 companies, MAB 0.89) and Real Estate (19 companies, MAB 0.87) industry groups exhibited MABs slightly less than 1.

The Consumer Discretionary (8 companies) industry group exhibited the lowest MAB at 0.71, headlined by media and entertainment companies ABS (0.52) and GMA7 (0.72), as well as fast food giant JFC (0.67). Finally, the Financials (17 companies) industry group exhibited the second-lowest

MAB at 0.84, with major financial institutions such as BPI (0.75), CHIB (0.41), MBT (0.85), RCB (0.71), and SECB (0.54) all with asset betas less than 1.

It was noted that a few companies included in the study currently do not have operations, such as LIHC (Financials group), and GEO, UPM, and VUL (Materials group). However, testing the MAB computations excluding these companies do not significantly change the results, with the Materials group's MAB barely unchanged from 1.28 to 1.27 and the Financial group's MAB further declining from 0.84 to 0.81.

5.2   Defensive Companies

The computed mean asset beta (MAB) for defensive companies was 0.70, with a variance of 0.09 and standard deviation of 0.29. All four industry groups (no Health Care companies were included in the study) comprising the Defensive industry sector – Consumer Staples (7 companies, MAB 0.78), Energy (7 companies, MAB 0.73), Utilities (9 companies, MAB 0.64), and Telecommunication Services (2 companies, MAB 0.58) – exhibited MABs less than 1, which is consistent with expectations.

5.3   Sector Earnings Variability and Mean Asset Beta

Based on the above, the mean asset betas for four cyclical sectors – Consumer Discretionary, Financials, Information Technology, and Real Estate – were not found to be greater than 1.0 as expected. A possible explanation for this counter-intuitive behavior is that while they are classified as cyclical sectors, companies within those sectors may exhibit defensive characteristics, most especially in terms of earnings variability relative to the overall economy. Note that the GICS methodology – as it classified cyclical and defensive sectors using stock returns – does not explicitly consider the earnings variability of the companies.

As such, additional procedures were conducted in order to see whether sector earnings variability can be related to the observed mean asset betas for each sector:

1. Quarterly earnings starting March 31, 1999 (earliest available data) of the selected firms in the four cyclical sectors and in the defensive sectors were obtained, and quarter-on-quarter % changes were computed.
2. For the four cyclical sectors, the percentage changes were averaged across the firms within the same sector. Each firm was given equal weight in computing the mean quarterly earnings % change per sector, for consistency with the equal weighting in determining the mean asset beta.
3. For the defensive sectors, the percentage changes were averaged across all firms in all sectors for purposes of determining a "defensive earnings variability" benchmark. Each firm was also given equal weight in computing the mean quarterly earnings % change.
4. Corresponding quarterly levels of the PSEi were obtained, and quarter-on-quarter % changes were computed.
5. The computed mean quarterly earnings % change per cyclical sector was correlated against the quarterly % change in the PSEi.
6. The computed mean quarterly earnings % change for the defensive sectors was correlated against the quarterly % earnings change in the PSEi.

The results of the correlation analysis are as follows:

Table 5. Sector Earnings Correlation against PSEi

Sector	Correlation Coefficient
Consumer Discretionary	-0.023
Financials	0.078
Information Technology	0.020
Real Estate	0.032
Defensive Average	**0.057**

The above results showed that three out of the four cyclical sectors displayed earnings variability relative to PSEi performance below the defensive average (which, as expected, shows only a very

weak positive correlation), while the Financials sector was above the defensive average but still exhibited weak correlation against the economy. The above procedure illustrates that earnings variability may help explain why the above cyclical sectors all have MABs lower than 1.0, which are consistent with defensive sector averages.

5.4   Cyclical/Defensive Reclassification Based on Earnings Variability

Another way to check the impact of earnings variability is to ignore sectoral classifications and simply group all companies with respect to their correlation of their earnings to economic performance, i.e., companies with quarterly earnings movements positively correlated to quarterly PSEi returns are classified as Cyclical, while companies with quarterly earnings movements negatively correlated to quarterly PSEi returns are classified as Defensive.

Based on this methodology, a total of 68 companies were classified as Cyclical and 30 companies were classified as Defensive. As with the original, sector-based methodology, one-sample t-tests at 5% significance were performed on the resulting asset betas in order to determine whether the coefficients are significantly different from the market beta of 1.0. The results of the t-tests are summarized below:

Table 6. One-Sample T-test Results for Cyclical and Defensive Betas (Earnings-based)

	Cyclical Betas
Mean	0.87000
Variance	0.18082
Observations	68
Hypothesized Mean	1
df	67
t Stat	**(2.52100)**
P(T<=t) one-tail	0.00704
t Critical one-tail	**1.66792**

One-sample t-test for cyclical betas
$H_0: \beta_{asset} \leq 1$, $H_a: \beta_{asset} > 1$

Conclusion: DO NOT REJECT NULL
β_{asset} is not significantly > 1

	Defensive Betas
Mean	0.92633
Variance	0.11989
Observations	30
Hypothesized Mean	1
df	29
t Stat	**(1.16529)**
P(T<=t) one-tail	0.12670
t Critical one-tail	**(1.69913)**

One-sample t-test for defensive betas
$H_0: \beta_{asset} \geq 1$, $H_a: \beta_{asset} < 1$

Conclusion: DO NOT REJECT NULL
β_{asset} is not significantly < 1

The above test was inconclusive for both Cyclical and Defensive stocks (with Cyclical MAB actually lower than the Defensive MAB), but the results may be attributable to the observation that the earnings correlations for both Cyclical and Defensive stocks may not be strong enough to exhibit significant differences from the market – average correlation for Cyclical stocks is +0.13, while average correlation for Defensive stocks is -0.08. Furthermore, specific earnings adjustments may be necessary for the stocks covered in the study.

Overall, earnings variability may indeed have an impact in the beta estimation for Cyclical and Defensive companies, although the magnitude of such impact is beyond the scope and objective of this paper.

6   Conclusion

The business nature of a company provides a clue to the sensitivity of its operations to the economy, which is reflected in the asset beta of the company's stock. However, as seen in the study, Cyclical companies on average do not conform to the practitioner's industry asset beta sense-check of > 1, while Defensive companies on average are consistent with the sense-check of < 1.

The results of the study suggest that, in performing tests of reasonableness or practical, quick-and-dirty valuations, a reasonable asset beta estimate of 0.70 may be used for Defensive companies – or better yet, sector-specific MABs ranging from 0.60-0.80 depending on which defensive sector the subject company belongs in. Company-specific asset betas are usually not preferred as the basis for the beta estimate in the valuation process – Damodaran (2002) noted that "while regression betas are noisy and have large standard errors, averaging across regression betas reduces the noise in the estimate" (p. 29).

However, for Cyclical companies, the preferred approach is to dispense with a practical, rule-of-thumb estimate and instead focus on scrutinizing the company's business closely to determine whether its beta estimate is reasonable or not. In particular, the analyst may examine accounting metrics such as earnings variability, which was empirically tested to be related to beta by Beaver, Kettler, and Scholes (1970) and updated by Jarvela, Kovyra, and Potter (2009)—although the 2009 study found weaker relationships relative to the 1970 study.

Other beta derivation procedures should also be refined. Instead of merely relying on sector classifications, particular care must be taken in filtering peer companies to be used in the asset beta determination for close comparability primarily in terms of business activities and size of operations. For holding companies and conglomerates, instead of using an overall beta estimate, segment betas should be used to capture the specific risks present in each business segment.

Overall, the analyst must watch out for company-specific phenomena and appreciate the nature and operations of the company in order to determine appropriate beta coefficients for valuation.

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Appendix A
Definition of GICS Sectors (effective September 1, 2016)[3]

Energy Sector
The Energy Sector comprises companies engaged in exploration & production, refining & marketing, and storage & transportation of oil & gas and coal & consumable fuels. It also includes companies that offer oil & gas equipment and services.

Materials Sector
The Materials Sector includes companies that manufacture chemicals, construction materials, glass, paper, forest products and related packaging products, and metals, minerals and mining companies, including producers of steel.

Industrials Sector
The Industrials Sector includes manufacturers and distributors of capital goods such as aerospace & defense, building products, electrical equipment and machinery and companies that offer construction & engineering services. It also includes providers of commercial & professional services including printing, environmental and facilities services, office services & supplies, security & alarm services, human resource & employment services, research & consulting services. It also includes companies that provide transportation services.

Consumer Discretionary Sector
The Consumer Discretionary Sector encompasses those businesses that tend to be the most sensitive to economic cycles. Its manufacturing segment includes automotive, household durable goods, leisure equipment and textiles & apparel. The services segment includes hotels, restaurants and other leisure facilities, media production and services, and consumer retailing and services.

Consumer Staples Sector
The Consumer Staples Sector comprises companies whose businesses are less sensitive to economic cycles. It includes manufacturers and distributors of food, beverages and tobacco and producers of non-durable household goods and personal products. It also includes food & drug retailing companies as well as hypermarkets and consumer supercenters.

Health Care Sector
The Health Care Sector includes health care providers & services, companies that manufacture and distribute health care equipment & supplies, and health care technology companies. It also includes companies involved in the research, development, production and marketing of pharmaceuticals and biotechnology products.

Financials Sector
The Financials Sector contains companies involved in banking, thrifts & mortgage finance, specialized finance, consumer finance, asset management and custody banks, investment banking and brokerage and insurance. It also includes Financial Exchanges & Data and Mortgage REITs.

Information Technology Sector
The Information Technology Sector comprises companies that offer software and information technology services, manufacturers and distributors of technology hardware & equipment such as communications equipment, cellular phones, computers & peripherals, electronic equipment and related instruments, and semiconductors.

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[3] GICS Sector Definitions. Retrieved from
https://www.msci.com/documents/10199/4547797/GICS+Sector+definitions-Sep+2016.pdf/7e5236a8-2ddd-4e29-a8bf-18f394c7f0fb

Telecommunication Services Sector
The Telecommunication Services Sector contains companies that provide communications services primarily through a fixed-line, cellular or wireless, high bandwidth and/or fiber optic cable network.

Utilities Sector
The Utilities Sector comprises utility companies such as electric, gas and water utilities. It also includes independent power producers & energy traders and companies that engage in generation and distribution of electricity using renewable sources.

Real Estate Sector
The Real Estate Sector contains companies engaged in real estate development and operation. It also includes companies offering real estate related services and Equity Real Estate Investment Trusts (REITs).

Appendix B
Company Names and Tickers

CYCLICAL COMPANIES			
Ticker	**Company Name**	**Ticker**	**Company Name**
Consumer Discretionary			
ABS	ABS-CBN Corporation	LR	Leisure & Resorts World Corporation
GMA7	GMA Network, Inc.	PLC	Premium Leisure Corp.
JFC	Jollibee Foods Corporation	WEB	PhilWeb Corporation
LOTO	Pacific Online Systems Corporation	WPI	Waterfront Philippines, Incorporated
Financials			
AC	Ayala Corporation	MBT	Metropolitan Bank & Trust Company
APO	Anglo Philippine Holdings Corporation	MPI	Metro Pacific Investments Corporation
BDO	BDO Unibank, Inc.	PNB	Philippine National Bank
BKR	Bright Kindle Resources & Investments Inc.	PSE	The Philippine Stock Exchange, Inc.
BPI	Bank of the Philippine Islands	RCB	Rizal Commercial Banking Corporation
CEI	Crown Equities, Inc.	SECB	Security Bank Corporation
CHIB	China Banking Corporation	UBP	Union Bank of the Philippines, Inc.
COL	COL Financial Group, Inc.	V	Vantage Equities, Inc.
LIHC	Lodestar Investment Holdings Corporation		
Industrials			
AEV	Aboitiz Equity Ventures, Inc.	IPM	IPM Holdings, Inc.
AGI	Alliance Global Group, Inc.	JGS	JG Summit Holdings, Inc.
ANS	A. Soriano Corporation	MAC	MacroAsia Corporation
APC	APC Group, Inc.	PAX	Paxys, Inc.
DMC	DMCI Holdings, Inc.	SM	SM Investments Corporation
EEI	EEI Corporation	SMC	San Miguel Corporation
ICT	International Container Terminal Services, Inc.		
Information Technology			
GREEN	Greenergy Holdings Incorporated	ISM	ISM Communications Corporation
Materials			
APX	Apex Mining Co., Inc.	MARC	Marcventures Holdings, Inc.
AR	Abra Mining and Industrial Corporation	NI	NiHAO Mineral Resources International, Inc.
AT	Atlas Consolidated Mining and Development Corporation	ORE	Oriental Peninsula Resources Group, Inc.
GEO	GEOGRACE Resources Philippines, Inc.	PX	Philex Mining Corporation
HLCM	Holcim Philippines, Inc.	T	TKC Metals Corporation
LC	Lepanto Consolidated Mining Company	UPM	United Paragon Mining Corporation
MA	Manila Mining Corporation	VUL	Vulcan Industrial & Mining Corporation
Real Estate			
ABA	AbaCore Capital Holdings, Inc.	MRC	MRC Allied, Inc.
ALI	Ayala Land, Inc.	OM	Omico Corporation
BEL	Belle Corporation	RLC	Robinsons Land Corporation
BRN	A Brown Company, Inc.	RLT	Philippine Realty and Holdings Corp.
CHI	Cebu Holdings, Incorporated	SHNG	Shang Properties, Inc.
ELI	Empire East Land Holdings, Inc.	SLI	Sta. Lucia Land, Inc.
FDC	Filinvest Development Corporation	SMPH	SM Prime Holdings, Inc.
FLI	Filinvest Land, Inc.	VLL	Vista Land & Lifescapes, Inc.
GERI	Global-Estate Resorts, Inc.	WIN	Wellex Industries, Incorporated
MEG	Megaworld Corporation		

DEFENSIVE COMPANIES			
Ticker	Company Name	Ticker	Company Name
Consumer Staples			
COSCO	Cosco Capital, Inc.	RFM	RFM Corporation
FOOD	Alliance Select Foods International, Inc.	URC	Universal Robina Corporation
GSMI	Ginebra San Miguel, Inc.	VITA	Vitarich Corporation
PIP	Pepsi-Cola Products Philippines, Inc.		
Energy			
BSC	Basic Energy Corporation	PERC	PetroEnergy Resources Corporation
OPM	Oriental Petroleum and Minerals Corporation	PNX	Phoenix Petroleum Philippines, Inc.
OV	The Philodrill Corporation	SCC	Semirara Mining and Power Corporation
PCOR	Petron Corporation		
Telecommunication Services			
GLO	Globe Telecom, Inc.	TEL	PLDT Inc.
Utilities			
ACR	Alsons Consolidated Resources, Inc.	LPZ	Lopez Holdings Corporation
AP	Aboitiz Power Corporation	MER	Manila Electric Company
EDC	Energy Development Corporation	MWC	Manila Water Company, Inc.
FGEN	First Gen Corporation	PHEN	PHINMA Energy Corporation
FPH	First Philippine Holdings Corporation		