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# Target price accuracy: South African equity market

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# Target Price Accuracy: South African Equity Market

**Master of Management in Finance and Investments**

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## Abstract

Much that has been studied around target prices has generally revealed weak prediction ability on individual analysts' level. In this report, we pursue an unprecedented approach and analyse consensus target price forecasting ability. Like past academic works, we conclude that, consensus target price accuracy in forecasting future market share price is inadequate, with consistent prediction errors that are fairly auto-correlated. We also discovered that target price prediction errors are correlated to earnings forecast errors suggesting that the latter is underpinned by earnings forecast. Regarding our last objective, we found out that prediction errors are positively related to implicit return, earnings per share and price per book value but negatively related to market capitalisation of companies.

## Table of Contents

**Abstract** ..... **i**
**List of Tables** ..... **iii**
**List of Figures** ..... **iii**
**Declaration** ..... **iv**
**Chapter One: Introduction** ..... **1**
1.1 Background ..... 1
1.2 Research Problem ..... 2
1.3 Research Objectives ..... 2
1.4 Significance of the study ..... 3
1.5 Structure of the final thesis ..... 3
**Chapter Two: Literature Review** ..... **5**
2.1 Overview of Analyst Report ..... 5
2.2 Analyst Earnings Forecast ..... 6
2.3 Analyst Target Price ..... 7
2.4 Analyst Stock Recommendations ..... 10
**Chapter Three: Methodology** ..... **11**
3.1 Data and data sources ..... 11
3.2 Defining Accuracy ..... 15
3.3 Hypothesis ..... 17
**Chapter four: Results** ..... **18**
4.1 Target price accuracy and summary statistics ..... 18
4.2 Prediction errors ..... 20
4.3 Target price accuracy and stock recommendation ..... 21
4.4 Target Price accuracy vs Earnings estimates ..... 22
4.5 Factors that affect target price accuracy ..... 22
4.6 Results interpretation ..... 24
**Chapter five** ..... **25**
5.1 Conclusion ..... 25
**References** ..... **27**
**Appendices** ..... **30**

## List of Tables


1. Table 1: Descriptive summary of statistics
2. Table 2: Summary of analysts' following per industry
3. Table 3: Summary of recommendations and analysts' following
4. Table 4: Accuracy metrics
5. Table 5: Analysis of prediction errors
6. Table 6: Target price accuracy versus recommendations
7. Table 7: Market factors affecting target price accuracy


## List of Figures


1. Figure 1: Earnings estimates versus target price accuracy
2. Figure 2: PicknPay
3. Figure 3: Mediclinic
4. Figure 4: Mr Price
5. Figure 5: Naspers
6. Figure 6: Telkom
7. Figure 7: The Foschini Group
8. Figure 8: Vodacom
9. Figure 9: Aspen
10. Figure 10: BHP
11. Figure 11: Firstrand
12. Figure 12: Impala
13. Figure 13: Imperial
14. Figure 14: Sasol
15. Figure 15: Shoprite
16. Figure 16: South 32
17. Figure 17: Bidvest
18. Figure 18: Truworths
19. Figure 19: Woolworths
20. Figure 20: Clicks
21. Figure 21: Life Healthcare
22. Figure 22: Netcare
23. Figure 23: Sappi
24. Figure 24: Spar
25. Figure 25: Tiger brands
26. Figure 26: Absa group
27. Figure 27: Anglo America
28. Figure 28: Anglo American Platinum
29. Figure 29: Anglo Gold Ashanti
30. Figure 30: Anheuser-Busch Inbev
31. Figure 31: British American Tobacco
32. Figure 32: Glencore
33. Figure 33: Goldfields
34. Figure 34: Kumba Iron Ore
35. Figure 22: Massmart
36. Figure 36: MTN
37. Figure 37: Sibanye Gold

38. Figure 38: Standard Bank group
39. Figure 39: Nedbank group

## Declaration

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**2**. I declare that this report is my own original work. Where other people's work has been used (either from a printed source, Internet or any other source), this has been properly acknowledged and referenced in accordance with departmental requirements.

**3.** I have not used work previously produced by another student or any other person to hand in as my own.

**4**. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

SIGNATURE: P.Sebele

Date: 24 June 2019.

# Chapter One: Introduction

## 1.1 Background

Academic community and industry participants have shown great appreciation of analysts' equity research reports. Consequently, much has been documented about main constituents of an equity report namely, earnings forecast, stock recommendation and target price. Surprisingly, past studies have been skewed towards the first and second. Only recently have researchers shown interest in target prices. Kerl (2011) noted that the dearth of literature on target prices was due to target price data unavailability. A similar view is shared by Gleanson, Johnson and Li (2008), who pointed out 1997 was the first-year financial databases fully captured target prices.

Target prices are estimates of future market prices of financial securities. This variable is especially interesting in mainstream finance and investment as it implicitly suggests a return on investment in line with standard definition of investment return (ending price divided by beginning price minus one). Sell side analysts arrive at this one figure through all-embracing research, expertise, time and other specially-enabling facilities. Assessment of predictive performance or forecasting ability of these financial professionals around this important variable is therefore greatly essential.

Motivation for this thesis stems from mixed empirical evidence in the literature and divided sentiments in the financial sector regarding value provided by target prices. Front. (2001) described target prices as "purely marketing" and Morgenson. (2001) went further to label target prices as "hazardous to investor's wealth". On the other end, many financial players view target prices as greatly valuable in promoting efficient allocation of assets. The current knowledge does not provide consensus applicable across borders on this issue. This presents a great need to carry out an academic investigation to contribute to the African coverage in the literature. Moreover, this topic is worthy of academic study following recent regulatory amendments in Europe (MiFID – Markets in Financial Instruments Directive II) that will have pronounced consequences on European sell-side research and likely spillover to the South African market in one way or the other. MiFID is a legislation regulating investments services within the European economic area. Its main objective is to improve transparency across the European Union's financial markets and standardise the regulatory disclosures. MiFID II is the latest version of this regulatory standard which demands for sell-side research to be priced separately from trading and execution services. Therefore, establishing the value of equity reports, inclusive of target prices, is indispensable and relevant in addressing this regulatory framework.

Analysts' overall performance is commonly measured by stock picking ability, earnings forecast accuracy, quality of written reports, and overall services. Target price accuracy is usually not part of the criteria; adding to observations by Brav and Lehavy (2003) and Asquith, Mikhail, and Au (2005) that target price accuracy is mainly an unmonitored activity. This would imply that "Analysts might have limited incentives for primarily focusing on target price accuracy since bonuses depend on a whole set of performance variables – not necessarily on target price accuracy" (Kerl, 2011). However, investigating target price accuracy is important for both analysts and their employers for the following reasons. There is a critical trade-off inherent in setting target prices. If an analyst strategically quotes a higher target price, perhaps to attract institutional investors, there is high chance of such a target price not being reached, which will result in a deterioration of the analysts' reputation. On the other end, if an analyst tactically sets a low target price, there is a real risk of reduced business from significant institutional clients. Consequently, the forecasting of target price is an integral part of research equity reports and worthy of academic investigation.

## 1.2 Research Problem

Bonini, Zanetti and Bainchini, (2010) documented that "analysts' forecasting accuracy is very limited: prediction errors are consistent, auto-correlated, non-mean reverting and large". This research finding is presents a problem in the field of investments as both institutional and individual investors consume information in equity reports, inclusive of target prices. Inaccurate forecasting is problematic because target prices represent implicit return on a share on condition that they materialise within the stipulated holding period. On the assumption that investor's asset allocation decisions are influenced by target prices, this paper aims to investigate forecasting errors as well as the statistical significance of these forecasting errors in consensus target prices. This is will provide empirical evidence on the accuracy of consensus target price (average of all analysts tracked by Bloomberg) compared to target prices set by individual analysts. This will enhance how investors interpret and incorporate target prices in their investment decisions.

## 1.3 Research Objectives

The broad theme of this research paper is to investigate sell-side equity analysts' forecasting ability. The focal point is on how target prices quoted in research reports materialise to market prices that prevail within the stipulated period suggested by analysts. In particular, the study has the following sub-objectives:

- To investigate the accuracy of target prices in predicting future share performance.
- To establish the relationship between target prices and earnings forecasts.

- To investigate the factors that significantly impact on the accuracy of analysts target prices.

## 1.4 Significance of the study

Analysts' target prices, together with other two components of equity reports, have been studied for various motivations, but mostly for their forecasting ability. Firstly, many past academic works are based on individual analysts' target price accuracy and have generally pointed towards weak forecasting accuracy, with consistent prediction errors that are not mean-reverting, Bonini et al. (2010). No work has been documented analysing the consensus target price (factoring in all analysts covering the same stock). We therefore aim to contribute to the current literature by evaluating consensus target price predictive ability. Moreover, these previous studies were mainly focused on developed markets like United States of America and European region. Apart from Song, Saw-imm and Chu's (2017) research on Malaysia, we are not aware of other academic works on emerging markets. Therefore, this paper aims to contribute to current literature by analysing target price accuracy in South Africa as an emerging market and an important part of BRICS (Brazil, Russia, India, China and South Africa). The need for this academic research in the context of emerging markets is motivated by their capital market characteristics such as, rapid growth, high returns, and high volatility and diversification benefits for investors in developed markets. Additionally, capital markets are usually charaterised as less mature and relatively information inefficient. This presents greater value for ground-level research. Consequently, extending analysis of target price accuracy in this region is imperative. Secondly, the three main components of equity reports have been examined individually in most of earlier research. This thesis will attempt to establish the relationship between target prices and earnings forecast.

Analysis of target price accuracy is especially significant to retail investors because they have limited resources and lack appropriate skills to conduct their own in-depth research unlike institutional investors that commonly have in-house research team, Huang et al., (2017). Therefore, it is important to investigate analysts' target price accuracy for companies that have high institutional ownership and for companies that are dominated by retail investors.

## 1.5 Structure of the final thesis

The rest of the thesis is organised as follows: Chapter 2 provides comprehensive examination of related academic research, outlining their strengths and weaknesses as well as identifying the gap this paper aims to fill in the literature. Chapter 3 accounts for specifics about the data used in this report and covers research methodology and statistical techniques employed in analysing data. In chapter 4, research findings are discussed. Lastly, chapter 5 provides

concluding remarks and suggests questions that arise from the research results that would be interesting to explore in the future.

# Chapter Two: Literature Review

## 2.1 Overview of Analyst Report

Analysts' equity research report is comprised of three significant components of potentially useful information for majority of financial market participants namely, stock recommendation, earnings forecast and target price (and of course justifications for how they computed the above). These are all equally important pieces of information that could influence investors' investment strategies and be guidance on the future level of stock prices. This segment will demonstrate the breadth and diversity of the related academic works conducted around these three pillars of equity reports.

An equity report is essentially a forward-looking surveillance that aims to predict future earnings of a company as well as possible market price likely to prevail within a specific time. Forecasting is therefore, probably the most significant aspect of the report. A great deal of literature covers numerous reasons and possible factors that affect the equity analysts' forecast ability that leads to inaccuracies in their earnings forecast, target price and ultimately their stock recommendation. Berger, Ham and Kaplan (2016) assembled explanations for analysts forecast errors into two wide categories. They named one group as strategic bias: bias that analysts commit intentionally when forecasting. The other termed processing bias: bias analysts make when they transfer information into their forecast models. Below is empirical evidence-based discussion on various forms of these forecast biases and other factors that impact the accuracy of analysts' forecasting.

Schipper (1991) reported that security analysts make use of value-relevant information about firms that they are valuing to compute earnings forecast, stock recommendation and target price and this includes both financial and non-financial information. Regarding non-financial information, one piece of information that usually gets much attention and is often referred to as the most significant, is management quality, Grunert et al, (2005). On the same note, Becker, Medjedovic and Merkle (2017) used CEO extroversion as treatment variable and their research found that financial analysts provide more favourable forecasts (earnings per share, long-term earnings growth and target price) for firms that have extroverted CEOs. They also report that similarity bias has huge effects in financial forecasts. They discovered that analysts supply more positive forecasts for CEOs that they see as similar to themselves.

Another prominent factor affecting forecasting ability is affiliation. (James and Karceski, 2005) did a study on affiliation bias and found that lead-analysts usually provide significantly more favorable recommendation and higher target price ratios for companies that are affiliated with them. Jackson et al. (2006) identified optimism as among the leading factors influencing the inaccuracy of the analysts' forecasts. They carried out an investigation on possible issues that

impact on optimism and compared their contributing strengths. They included the underwriting business for investment banks, trading business and reputation. They concluded trading-generating incentives are as strong or even stronger than investment banking incentives in determining the optimism in analysts' equity research reports. Furthermore, studies that shed light on affiliation bias include Cliff and Denis (2002) as well as Aggarwal and Womack (2002). They both established that there are "systematic links between the level of underpricing and the degree of analysts' coverage following IPO". Michaely and Womack (1999) argued, equity research analysts are commonly involved in the due-diligence and marketing process connected with an offering. Accordingly, they reasonably deduce that it is likely that investment bankers have access to research analysts view about which firms are comparable to the issuing firm even though the investment banking division is theoretically required to maintain stringent separation (usually known as Chinese Wall) between underwriting proceedings and equity research functions when pricing an IPO.

## 2.2 Analyst Earnings Forecast

Over a decade ago, Stockel (1992) conducted an experiment in the United States and documented that there is a positive association between earnings forecast accuracy and analysts' reputation. He used a proxy for reputation as membership on the Investor's All-American Research Team. Mikhail (1997) hypothesised analysts' firm-specific experience (measured as the number of quarters since the analysts' first earnings forecast release) could improve accuracy in earnings forecast. From his study, he established a significant decline in the number of earnings forecast errors by analysts as the firm-specific experience increases. On the same note, Clement (1999) established there is a positive link between analysts' forecast accuracy and their experience as well as their firm size (seen as indicative of availability of resources). Another influence of earnings forecast stems from institutional and jurisdictional differences. In their research, Chang, Khanna and Palepu (2000) found evidence that a country's legal system explains a lot of variation in earnings forecast accuracy. On the other hand, research findings of Ang and Ciccone (2001) reached an opposite conclusion about the matter above.

Bae, Stuls and Tan (2008) focused mainly on the impact of local coverage. They researched about analysts that follow companies located in the same country they reside in and those covering foreign listings. They reported that, local analysts produce more precise earnings forecasts. Put differently: analysts residing in the same country as the company they are following provided earnings forecasts with less errors than for companies in foreign boundaries. Moreover, they discovered that local analysts are especially at an advantage in countries where earnings are smoothed more, where firms disclose less information to the public and firm idiosyncratic information explains a smaller fraction of stock returns.

Affiliation seems to be a major point of debate concerning analysts' earnings forecasts and target price accuracy. Chen and Martin (2011) suspected that, within larger investment banks that have diverse operations, "there is information spillover from commercial banking division to equity research". This inference stems from their research results that showed that equity analysts are more accurate in their earnings prediction and target price after the underlying firms borrow from their affiliated banks. They reiterate that their findings prevail more in cases of borrowers with greater information asymmetry as well as for borrowers with bad news and usually with high credit risk. On an identical note, Kerl (2012) gathered that business associations and personal affiliations for equity analysts are positively related with earnings forecast accuracy and this observation is consistent with conflict of interest driving target price optimism.

## 2.3 Analyst Target Price

Central to this paper is the accuracy of analyst target price. Below are some previous academic studies that are closely related in discussions of target price accuracy. Bonini et al. (2010) conducted a research on the Italian market. Their results led to a conclusion that analysts demonstrate limited ability to forecast prices and they believe this is mostly caused by the fact that target price prediction is largely an unmonitored activity. They further documented target prices quoted in analysts' research reports seem to be systematically influenced by factors including, "analysts' boldness, firm size and market momentum". Bradshaw, Brown and Huang (2014) also reached a comparable conclusion that poor target price forecast is attributable to the business practice of not monitoring such an activity. From their investigation carried out in the United States, they reported that the limited statistical evidence of some analysts to supply accurate estimates of target price over a long time could possibly be a sign of their persistent differences in forecast optimism.

Analysts' target price represents a more explicit valuation and ultimate view about the expected future value of a stock estimated to materialise within a particular time, usually between six to twelve months. This figure determined by professional and well-informed market observers is especially appealing because it coincides with the intuitive and conceptually well-established definition of expected return: future value dividend by current value minus one. Additionally, target price was selected as an interesting quantity to explore over the other two because it is the only one that can be assessed against a market-determined and easily observable variable (market price) and therefore considered the most key constituent of an analysts' research report. Asquith et al. (2005) documented a similar conclusion that the information in target price subsumes the information in both recommendations and earnings forecast. Moreover, Bradshaw (2002) reported that target price in research reports reflect analysts' valuations of securities being covered. He further

showed that equity research analysts are less likely to issue out target price when they are not adequately confident in their forecasts. On the same note, Bradshaw (2004) later discovered that valuations computed using residual income model based on earnings and growth forecasts such as, implied cost of capital, fail to accurately mirror analysts' appraisal of share value.

Despite the crucial role target prices play in an equity report, Kerl (2011) pointed out that prior academic literature was heavily skewed towards covering earnings forecasts and recommendations "(see Abdel-Khalik and Ajinkya, 1982; Elton, Gruber, and Grossmann 1986; Lys and Sohn, 1990; Stickel, 1991; Stickel, 1995; Womack, 1996: Mikhail, Walther, and Willis, 1997)". Brav and Lehavy (2003) attempted to explain this selective coverage by revealing that major financial databases only began capturing target price around 1997. Gleason, Johnson, and Li (2008), and Asquith, Mikhail, and Au (2005) also reached similar conclusions on data availability. A further proof of this is found from the work of Bradshaw, Huang and Tan (2014) where they conducted a quick survey of scholarly journals on ABI/INFORM Global database whereby they searched the database using "a combination of 'analysts' with 'earnings', 'recommendation', 'target price' and the output was 867, 149 and 14" papers in that respective order. Only recently has a substantial portion of academic research included target prices. Lin and Tan (2013) made use of a big sample (6 415 U.S firms) to investigate target price forecasts over the observation period between 1999 and 2011. They reported that target price changes predict institutional trading when they controlled for changes attributable to recommendations and earnings forecast. Ishigami and Takeda (2017) examined the effects of target price on the stock market and found that "for ratings of the same direction, the market reacts more positively to an increase in target price than to a reduction in target price". Lastly, Roger, Roger (a) and Schatt (2018) documented that "When analysts are optimistic (pessimistic), they issue more optimistic (pessimistic) target prices for small price stocks than for large price stocks"

Kerl (2011) performed a survey on the German market on target price accuracy and found that firm-specific as well as the level of target price have a negative relationship with the accuracy of the target price. Bilinski, Lyssmachou and Walker (2013) made use of data from 16 countries. Their findings were, there exists a correlation between target price accuracy and analysts' boldness, frequency at which analysts revise their forecasts, analysts' characteristics and their firm affiliation.

Many of these previous studies were carried out in regions or countries and this presents a challenge in comparing their results across borders because of underlying differences in institutional environment and conditions in which these analysts and firms operate within. For instance, Billinski, Lyssimachou and Walker (2013) reported from their research across 16 countries, bank affiliation with the stock under valuation increases target price accuracy while

on the same matter, Kerl (2011) found that such affiliation has no effect on target price accuracy in Germany.

There are several reports discussing the impact of target price on the stock market. Those that indicated no value include Front (2001), which describes target prices as "purely marketing". Another anti-target price individual was the New York Times journalist Morgenson (2001) when she reached a conclusion that "target prices are hazardous to investor's wealth". Tsao (2002) further stated that "in the end, stock ratings and target prices are just the skin and bones of analysts' research: the meat of such reports is in the analysis, detail and tone". Motivated by the above bold assertions, this section unpacks past studies that demonstrated the impact of target prices on the stock market. Brav and Lehavy (2003) carried out a research on the market impact of target price and their findings were, approximately 11% spread between upward and downward target price revisions impacted the market. Likewise, Asquith, Mikhail and Au (2005) reported that analysts' target prices have investment value incremental to their stock recommendations as well as other details contained in an equity research report. In addition, Huang, Mian and Sankaraguruswamy (2009) constructed portfolios based on published analysts' recommendations and target prices and learned that portfolios structured based on changes in analysts' recommendations and target prices were more profitable than those formed either on stock recommendations or target price disjointedly. Furthermore, Herrmann (2015) established that reports that contain substantial forecast and target price revisions are likely to impact the market. Da and Schaumburg (2011) documented, investors can gain valuable information from relative valuations implicit in target prices issued by equity analysts but also warned that the implied absolute valuations themselves are much less informative.

This segment further outlines common ways of deriving target prices as documented by prior academic studies. Bandyopadhyay, Brown and Richardson (1995) found that target price forecast revisions co-move with earnings forecast revisions and inferred that the heavy use of earnings forecast imply that analysts rely on earnings forecast to arrive at target prices. Similarly, Bradshaw (2002) reported that target prices seem to be based on earnings heuristic and further learned that analysts report target prices to justify and supplement their stock recommendations. More evidence pointing towards earnings forecast as influential on target price determination is provided by Da, Hong and Lee (2010), when their experiment yielded the investment value of target price is highly suspected to stem from both earnings forecast as well as implied discount rates embedded in the forecasts of P/E ratios. Da and Schaumburg (2011) investigated trading strategies influenced by target prices and discovered that the value of target prices can be mostly attributed to the equity analysts' ability to evaluate the relative pricing between securities in a specific industry or universe that they are covering. Gleanson, Johnson and Li (2013) suggest that valuation models have some play in target price derivation

after they examined the use of valuation models as justification for target price and established target prices associated with more rigorous valuation models indeed have more investment value.

## 2.4 Analyst Stock Recommendations

Analysts stock recommendations typically range from strong-buy, outperform, neutral to sell. They represent stock calls by analysts. Financial market participants have shown appreciation of this variable and it has consequently received considerable share of discussion in both academic sphere and industry papers. Among parties that rate analysts' equity reports and stock recommendations valuable is the Malaysian government. It made an announcement that it plans to put aside millions to facilitate and encourage brokerage firms to cover small to medium-size Malaysian publicly listed companies to promote and increase exposure and visibility (The Edge Malaysia, 13 Feb 2017). A recent study in Malaysia found positive value in analysts' reports. Song, Saw-imm and Chu (2017) conducted an experiment using 139 analysts' recommendations from multiple leading brokers in Malaysia. They reported that the forecasted recommendations by analysts produced highest potential of upside ranging from 10%-20%. They further found that approximately 80% of shares followed by analysts had generated positive returns with most of them recording around 20% within the 3-month observation period. Their study also pointed that 72% and 76% of the analysts' recommendations contributed to higher than average market returns for the 3-month and 6-month estimation period respectively.

# Chapter Three: Methodology

## 3.1 Data and data sources

We use the Bloomberg terminal as our primary source of data largely due to the 33.4% market share it commands in the financial data provider space with about 325k official users (Burton-Taylor international consulting, 2017). Its closest rival is Thomson Reuters with estimated market share of 23.1% and 190k users.

To determine the predictive ability of target prices, consensus target price (computed by the average of individual target prices of all subscribing analysts to Bloomberg), was analysed against the prevailing stock price within the estimated 12-month period (industry practice is 12-month forward looking target price). Target price accuracy on individual analyst level has been fairly discussed and most literature concludes that, “forecasting accuracy is very limited: prediction errors are consistent, auto-correlated, non-mean reverting and large (up to 36.6%)”, (Bonini et al., 2010). This motivated us to investigate the consensus target price instead and as far as we are aware, consensus target price has not been researched before. We argue research houses fiercely compete for more trading business and investment banking deals while analysts compete for reputation (Annual financial mail analysts ranking). It thus follows investors should continuously evaluate the accuracy of target prices and accordingly extend their business to consistent firms and analysts while penalising weak performers. On this basis, we expect forecasting by analysts to be accurate on average over time; especially collective (consensus) target price.

We cover all 371 JSE listed companies (CEICdata, 2018) to avoid significant selection bias of our sample that could result from hand-picking companies to analyse. Our estimation period is to 31 December 2018 (12-month forward looking consensus target price means such target price was quoted to be realised within the 12 months ending 31 December 2018). To establish reasonable level of average view of analysts on a stock, we apply the following filters: we first sieve-off companies followed by less than 10 analysts. We view 10 as a reasonable threshold given how thin the sell-side research market is in South Africa (Financial mail reports a total of 465 analysts in 2018). Moreover, table 1 below shows that the most followed stock, ABInBev, has 34 analysts. Making 10 the lower bound, our sample has an average analyst following of 15 per stock. Our final resulting sample has 38 shares which represent about R9 625.55bn market capitalization (63% of total JSE market capitalization).

**Table 1**.

**Descriptive summary of sample**

| Count | JSE symbol | Company name | Market capitalisation (28/12/2018) (R billion) |
|---|---|---|---|
| 1 | ANH | ANHEUSER-BUSCH INBEV SA NV | 1768.68 |
| 2 | NPN | NASPERS LIMITED | 1376.43 |
| 3 | BTI | BRITISH AM TOBACCO PLC | 1284.80 |
| 4 | GLN | GLENCORE XSTRATA PLC | 826.02 |
| 5 | BHP | BHP GROUP PLC | 700.83 |
| 6 | AGL | ANGLO AMERICAN PLC | 525.22 |
| 7 | FSR | FIRSTRAND LIMITED | 363.38 |
| 8 | SBK | STANDARD BANK GROUP LIMITED | 316.34 |
| 9 | SOL | SASOL LIMITED | 258.89 |
| 10 | VOD | VODACOM GROUP LIMITED | 220.10 |
| 11 | AMS | ANGLO AMERICAN PLATINUM LIMITED | 198.22 |
| 12 | S32 | SOUTH32 LIMITED | 192.51 |
| 13 | MTN | MTN GROUP LIMITED | 163.76 |
| 14 | ABG | ABSA GROUP LIMITED | 150.26 |
| 15 | NED | NEDBANK GROUP | 141.14 |
| 16 | KIO | KUMBA IRON ORE LTD | 124.65 |
| 17 | SHP | SHOPRITE HOLDINGS LIMITED | 96.49 |
| 18 | ANG | ANGLO GOLD ASHANTI LIMITED | 85.48 |
| 19 | BVT | THE BIDVEST GROUP LIMITED | 68.19 |
| 20 | APN | ASPEN PHARMACARE HOLDINGS | 65.27 |
| 21 | MRP | MR PRICE GROUP LIMITED | 56.01 |
| 22 | TBS | TIGER BRANDS LTD | 52.13 |
| 23 | CLS | CLICKS GROUP LTD | 48.36 |
| 24 | WHL | WOOLWORTHS HOLDINGS LIMITED | 47.11 |
| 25 | GFI | GOLD FIELDS LIMITED | 47.05 |
| 26 | MEI | MEDICLINIC INT PLC | 43.50 |
| 27 | SAP | SAPPI LIMITED | 41.78 |
| 28 | LHC | LIFE HEALTHCARE GROUP LTD | 39.81 |
| 29 | TFG | THE FOSCHINI GROUP LIMITED | 39.78 |
| 30 | SPP | THE SPAR GROUP LTD | 38.25 |
| 31 | IMP | IMPALA PLATINUM HOLDINGS | 38.13 |
| 32 | NTC | NETCARE LIMITED | 37.10 |
| 33 | TKG | TELKOM SA LIMITED | 35.13 |
| 34 | SGL | SIBANYE GOLD LIMITED | 33.99 |
| 35 | TRU | TRUWORTHS INTERNATIONAL LIMITED | 33.66 |
| 36 | PIK | PICKNPAY STORES LIMITED | 33.65 |
| 37 | MSM | MASSMART HOLDINGS LTD | 19.33 |
| 38 | IPL | IMPERIAL HOLDINGS | 14.14 |
| | | *Sample market capitalisation* | 9625.55 |
| | | *Total JSE market capitalisation* | 15382.00 |
| | | *Sample to JSE ratio* | 63% |

*Source: Bloomberg*

In table 2 below, it is demonstrated that resources and mining industries have the most companies in our sample (12 companies), followed by Food and drug retailers (5) and Health care, Apparel retailers and Banks; all with 4 companies each. It is worth noting that, Beverages and Tobacco have 34 and 24 analysts per company respectively although they each have only one company in our sample. Our sample has a total of 563 analysts covering the 38 companies. Resources and mining industry have the most analysts (208), accounting for about 37% of the total analysts. Automotive retailer industry has the lowest number of analysts (12).

**Table 2.**

**Summary of analysts following per industry**

| Industry | Companies | Analyst per company | Total Analysts |
|---|---|---|---|
| Resources and Mining | 12 | 17 | 208 |
| Food & Drug Retailers | 5 | 11 | 57 |
| Health Care Facilities | 4 | 13 | 50 |
| Retailers-Apparel | 4 | 12 | 49 |
| Banks | 4 | 13 | 52 |
| Telecom services | 3 | 14 | 43 |
| Internet Media | 1 | 14 | 14 |
| Automotive Retailers | 1 | 12 | 12 |
| Basic Materials & Paper | 1 | 10 | 10 |
| Food Producers | 1 | 10 | 10 |
| Beverages | 1 | 34 | 34 |
| Tobacco | 1 | 24 | 24 |

*Source: Bloomberg*

In terms of recommendation class, only 12 out of the 38 companies had more than 50% of analysts covering it with a 'buy call'. Interestingly, only Naspers; Media and Internet Company had all 100% buy recommendation from all analysts following it. On the other hand, Kumba Iron Ore had no buy recommendation from all the 11 analysts covering it. Consequently, 82% of Kumba's analysts recommended it a 'sell', making it the highest sell-call in our sample. We also note that the average call recommendation in our sample is 16%, in line with the industry-wide observation, analysts are overly bullish and hesitant to make sell-recommendations. Both the buy and hold recommendations have 42% average call recommendation. An industry with the most optimistic analyst's view; 'buy recommendation', is resources with 7 out 12 companies rated with a buy recommendation.

**Table 3.**

**Summary of recommendation and analysts following**

| Companies | Analysts | Buy | Hold | Sell |
|---|---|---|---|---|
| ANHEUSER-BUSCH INBEV SA NV | 34 | 79% | 15% | 6% |
| BHP GROUP PLC | 30 | 27% | 63% | 10% |
| ANGLO AMERICAN PLC | 28 | 68% | 21% | 11% |
| GLENCORE XSTRATA PLC | 28 | 75% | 25% | 0% |
| BRITISH AM TOBACCO PLC | 24 | 67% | 25% | 8% |
| SOUTH32 LIMITED | 20 | 45% | 45% | 10% |
| VODACOM GROUP LIMITED | 15 | 40% | 60% | 0% |
| MEDICLINIC INT PLC | 14 | 29% | 57% | 14% |
| NASPERS LIMITED | 14 | 100% | 0% | 0% |
| TELKOM SA LIMITED | 14 | 17% | 67% | 17% |
| SASOL LIMITED | 14 | 64% | 21% | 14% |
| ANGLO GOLD ASHANTI LIMITED | 14 | 50% | 36% | 14% |
| MTN GROUP LIMITED | 14 | 36% | 43% | 21% |
| FIRSTRAND LIMITED | 13 | 23% | 62% | 15% |
| IMPALA PLATINUM HOLDINGS | 13 | 39% | 54% | 8% |
| WOOLWORTHS HOLDINGS LIMITED | 13 | 25% | 42% | 33% |
| NETCARE LIMITED | 13 | 23% | 62% | 15% |
| THE SPAR GROUP LTD | 13 | 15% | 62% | 23% |
| ABSA GROUP LIMITED | 13 | 62% | 31% | 8% |
| GOLD FIELDS LIMITED | 13 | 46% | 39% | 15% |
| SIBANYE GOLD LIMITED | 13 | 54% | 31% | 15% |
| STANDARD BANK GROUP LIMITED | 13 | 39% | 54% | 8% |
| NEDBANK GROUP | 13 | 46% | 39% | 15% |
| PICKNPAY STORES LIMITED | 12 | 25% | 33% | 42% |
| MR PRICE GROUP LIMITED | 12 | 0% | 83% | 17% |
| THE FOSCHINI GROUP LIMITED | 12 | 58% | 25% | 17% |
| IMPERIAL HOLDINGS | 12 | 67% | 33% | 0% |
| SHOPRITE HOLDINGS LIMITED | 12 | 42% | 42% | 17% |
| THE BIDVEST GROUP LIMITED | 12 | 33% | 42% | 25% |
| TRUWORTHS INTERNATIONAL LIMITED | 12 | 33% | 33% | 33% |
| LIFE HEALTHCARE GROUP LTD | 12 | 42% | 58% | 0% |
| ANGLO AMERICAN PLATINUM LIMITED | 12 | 42% | 33% | 25% |
| ASPEN PHARMACARE HOLDINGS | 11 | 46% | 36% | 18% |
| KUMBA IRON ORE LTD | 11 | 0% | 18% | 82% |
| CLICKS GROUP LTD | 10 | 22% | 67% | 11% |
| SAPPI LIMITED | 10 | 56% | 33% | 11% |
| TIGER BRANDS LTD | 10 | 40% | 40% | 20% |
| MASSMART HOLDINGS LTD | 10 | 22% | 78% | 0% |

*Source: Bloomberg*

Our sample of 38 companies are followed by about 59 investment banks and research houses. Standard Bank Securities covers all the 38 companies, followed by Renaissance Capital with 36 and JP Morgan at par with Investec, covering 35 companies out of the 38. Interestingly, Financial Mail analyst ranking 2018 ranks Standard Bank Securities top of the list in terms of quality of research and overall brokerage services as evaluated by buy-side institutional investors.

## 3.2 Defining Accuracy

In this report, our primary objective is to assess the accuracy of target prices. We therefore incorporate various methodologies developed in the past to comprehensively achieve our goal. Asquith et al. (2005) used a methodology in which, target price was considered accurate if the stock market price reaches or exceeds the prescribed target at the end of the estimation period. More recently, Bonini et al. (2010) developed a more multidimensional methodology of testing target price accuracy which we make use of in our analysis.

Target prices automatically have an implicit return implied from the difference between the future market price (target price) and the current market price. We thus represent implicit return as follows:

$$IR = [TP_t/P_t]-1 \quad (1)$$

Where:
IR – Implicit Return
$TP_t$ – Target Price
$P_t$ – Market Price at the issuance of the target price

This prediction is met if at some point during or at the end of the time horizon, the underlying share price reaches the target price. We make use of accuracy methodology developed by Bonini et al., (2010). They named one metric 'Ideal Strategy' which catered for uncertainty into what level of price is ideal for investors as it could be challenging to determine when share price is at its maximum.

$$\delta_1 = [P_m/ P_t]-1 \quad (2)$$

$$\delta_2 = ((TP_t / P_m) -1) \mathbf{I} TP_t > P_t; 1 - (TP_t / P_m) \mathbf{I}\ TP_t < P_t \quad (3)$$

where:

*t*: Target price issue date

$P_t$: Market price at time *t*

$TP_t$: Target price at time *t*

$P_m$: Maximum/minimum price level within the prediction time horizon.

**Please note**: all δ variable implicit returns are calculated as follows:

*Maximum price if at t, $TP_t > P_t$ and the Minimum price if at t, $TP_t < P_t$.*

We define $\boldsymbol{\delta_1}$ as the 'ideal' return variable obtained from the difference between the maximum/minimum price over the estimation period and the share price at time *t*. We interpret $\delta_1$ as the maximum return that could be earned if future market prices could be perfectly estimated.

We introduce $\boldsymbol{\delta_2}$ as a measure of 'Ideal Strategy' prediction error computed by the difference between the maximum/minimum market price and the issued target price**.** When the target price is bigger than market price at time t, we label such a scenario as 'upside overshooting', suggesting that a share price is expected to increase more than the maximum market price that prevails at the end of the estimation period. On the hand, if the target price is smaller than the market price at time t, we label such a scenario as 'downside overshooting', implying a share price is expected to decline more than the minimum market price that prevails at the end of the estimation period.

Bonini et al. (2010) also developed another metric, which is an alternative to the 'Ideal Strategy' called 'Feasible Strategy', based on the assumption it is almost impractical to effectively anticipate when a share price has reached the maximum/minim level.

$$\delta_3 = [\, P_{t+n-3} / P_t] - 1 \qquad (4)$$

$$\delta_4 = (TP_t / P_{t+n-3}) - 1 \; \mathbf{I} TP_t > P_t;\; 1 - (TP_t / P_{t+n-3}) \mathbf{I}\; TP_t < P_t \qquad (5)$$

where:

*t+n-3*: Target price issue date minus three days date

$P_{t+n-3}$ : Market price at t+n-3

We define $\boldsymbol{\delta_3}$ as a measure of 'feasible return', capturing the difference between the market price at time *t* and the market price at the end of the estimation period.

Lastly, we formulate $\boldsymbol{\delta_4}$ to measure the 'Feasible Strategy' prediction error computed by the difference between target price and the prevailing market price at the end of the estimation period. Interpretation of $\boldsymbol{\delta_4}$ is similar to how we interpret $\boldsymbol{\delta_2}$ above in terms of upside overshooting and downside overshooting.

## 3.3 Hypothesis

We formulate the null hypothesis for zero average forecast error as follows:

Assumptions:

Let $P_{t,h}$ be market price of a share and that price follows a standard random walk process with drift denoted by $\mu_j$.

It follows that at time *t,* the market price of a share is given by the equation 6 below:

$$P_{t,j} = \mu_j + P_{t,j} - 1 + \varepsilon_{t,j}, \text{ where } \varepsilon_{t,j} \sim N(0,\sigma^2) \quad (6)$$

Factoring in future expectations in the drift, we arrive at equation 7 below:

$$E(P_{t,j}) = E(\mu_j) + P_{t-1,j} + \varepsilon_{t,j}, \text{ where } \varepsilon_{t,j} \sim N(0,\sigma^2) \quad (7)$$

The assumptions above imply that expected market prices can be found from cross-section of expected drifts from all market players. If we further assume that markets are sufficient, then these investor's expectations should converge to the market value that eventually prevails. It thus follows that;

$$\sum^{n} E(u_{ji}) w_i \rightarrow u_j \quad (8)$$

Where: $\omega_i$ is the relevant weighting factor

*n* is the investor

From the above equations, we can formulate that $E(P_{t,j}) \rightarrow P_{t,j}$ for every share. If we assume that markets are efficient then it follows that errors should be normally independent, identically distributed with zero mean and known variance. This also reduces to $TP_{t,j,i} = E(P_{t,j,i})$, as target prices are expected market prices. Prediction errors calculated as $TP_{t,j,i} - P_{t,i,}$ should be normally distributed with zero mean and known variance. Therefore, zero autocorrelation would signify possible systematic additional drifts in target price forecasting. 'Temporary non-zero prediction errors due to unexpected jumps in drift could well be observed but these should be random and deviations from zero in prediction errors across different periods should be non-correlated' (Bonini et al., 2010).

# Chapter four: Results

## 4.1 Target price accuracy and summary statistics

In the second column of table 4 below, we demonstrate Implicit Return, which would alternatively be defined as the implied one-year return. To incorporate other methodologies in the literature, column three shows a binary metric that indicates if target price has intersected with the market price at any point (labelled 1 if so, and 0 otherwise) within the estimation period as studied by Bradshaw and Brown (2006). Similarly, column four shows companies whose target price coincided with the market price at the end of estimation period as discussed by Asquith et al., (2005). In column five and six, we illustrate the 'control metric' and 'variable metric' for the Ideal Strategy as outlined above. Finally, column seven and eight show the 'control metric' and 'variable metric' for the Feasible Strategy.

**Table 4.**

| Accuracy metrics | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Long name** | **[$TP_t/P_t$]** | **TPmetANY** | **TPmetEND** | **$\delta_1$** | **$\delta_2$** | **$\delta_3$** | **$\delta_4$** |
| PICKNPAY STORES LIMITED | 7% | 1 | 0 | -7% | 0% | -3% | -5% |
| MEDICLINIC INT PLC | 35% | 1 | 0 | 11% | 0% | -43% | 95% |
| MR PRICE GROUP LIMITED | 0% | 1 | 1 | -15% | -6% | 1% | -21% |
| NASPERS LIMITED | 48% | 0 | 0 | 8% | 30% | -16% | 67% |
| TELKOM SA LIMITED | -11% | 1 | 0 | 32% | -5% | 32% | -5% |
| THE FOSCHINI GROUP LIMITED | 15% | 1 | 0 | -18% | 3% | -16% | -1% |
| VODACOM GROUP LIMITED | 7% | 1 | 0 | 15% | -2% | -9% | 24% |
| ASPEN PHARMACARE HOLDINGS | 46% | 1 | 0 | 6% | 20% | -51% | 162% |
| BHP GROUP PLC | 3% | 1 | 1 | 28% | -18% | 21% | -14% |
| FIRSTRAND LIMITED | 7% | 1 | 0 | -12% | -4% | -3% | -14% |
| IMPALA PLATINUM HOLDINGS | 6% | 1 | 0 | 15% | 21% | 13% | 23% |
| IMPERIAL HOLDINGS | 13% | 0 | 0 | -45% | 45% | -30% | 13% |
| SASOL LIMITED | 29% | 1 | 0 | 33% | -23% | -1% | 3% |
| SHOPRITE HOLDINGS LIMITED | 11% | 1 | 0 | 21% | 25% | -14% | 19% |
| SOUTH32 LIMITED | 12% | 0 | 0 | 22% | 14% | 1% | -5% |
| THE BIDVEST GROUP LIMITED | -1% | 1 | 1 | -18% | 7% | -5% | -8% |
| TRUWORTHS INTERNATIONAL LIMITED | -1% | 1 | 1 | 17% | 2% | -7% | -15% |
| WOOLWORTHS HOLDINGS LIMITED | 4% | 1 | 0 | -26% | 32% | -16% | 16% |
| CLICKS GROUP LTD | -2% | 1 | 1 | -13% | -9% | 6% | -25% |
| LIFE HEALTHCARE GROUP LTD | 10% | 0 | 0 | 6% | 1% | -5% | 13% |
| NETCARE LIMITED | 4% | 1 | 0 | 23% | 8% | 5% | -3% |
| SAPPI LIMITED | 20% | 1 | 0 | 13% | 45% | -9% | 35% |
| THE SPAR GROUP LTD | 6% | 1 | 0 | -15% | 10% | -4% | -2% |
| TIGER BRANDS LTD | 9% | 1 | 0 | -45% | 71% | -40% | 58% |
| ABSA GROUP LIMITED | 18% | 1 | 0 | -21% | 15% | -11% | 2% |
| ANGLO AMERICAN PLC | 10% | 1 | 0 | 0% | 9% | 26% | -14% |
| ANGLO AMERICAN PLATINUM LIMITED | 3% | 1 | 1 | 54% | -28% | 52% | -27% |
| ANGLO GOLD ASHANTI LIMITED | -6% | 1 | 0 | 43% | 69% | 41% | -5% |
| ANHEUSER-BUSCH INBEV SA NV | 51% | 0 | 0 | 6% | 25% | -30% | 91% |
| BRITISH AM TOBACCO PLC | 45% | 0 | 0 | 3% | 20% | -43% | 119% |
| GLENCORE XSTRATA PLC | 32% | 0 | 0 | 9% | 53% | -17% | 43% |
| GOLD FIELDS LIMITED | -2% | 1 | 1 | -37% | 53% | -9% | 7% |
| KUMBA IRON ORE LTD | -18% | 0 | 0 | -33% | -26% | -25% | -33% |
| MASSMART HOLDINGS LTD | 18% | 1 | 0 | -34% | 32% | -26% | 18% |
| MTN GROUP LIMITED | 12% | 1 | 0 | 0% | 81% | -35% | 42% |
| SIBANYE GOLD LIMITED | 37% | 1 | 0 | -9% | 1% | 7% | -14% |
| STANDARD BANK GROUP LIMITED | 9% | 0 | 0 | 5% | 28% | -34% | 105% |
| NEDBANK GROUP | 4% | 1 | 0 | -18% | 6% | -9% | -5% |

*Source: Bloomberg*

## 4.2 Prediction errors

In table 5 below, we illustrate average prediction errors and resulting autoregressive outcomes by analysts belonging to the top ten firms in our sample (ranked by number of companies they cover in our sample).

The following equation was regressed:

$$Y_{i,t}=\alpha_i+\beta_i Y_{i,t-n} + \varepsilon_i \quad (9)$$

Where:

α: *intercept (captures the stationary component in the prediction error)*

*n: number of lags*

*t: time operator*

*i: the i-th firm for which the test is run*

*β: Captures the auto-regression component on the lagged variable* $Y_{t-n}$.

Three lags were performed for each variable below.

**Table 5.**

| Analysis of Prediction errors | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $\delta_2$ | | | | | $\delta_4$ | | | | |
| | | AR(n) regressions | | | | | AR(n) regressions | | | | |
| Firm | Observations | Average | AR | Intercept | Coefficient | p-value | Average | AR | Intercept | Coefficient | p-value |
| SBG Securities | 40 | 0.029 | 1 | 0.014 | 0.03 | 0.0021 | 0.047* | 2 | 0.033* | 0.122* | 0.0081 |
| Renaissance | 36 | 0.012** | 1 | 0.023** | 0.015 | 0.1533 | 0.039 | 2 | 0.132 | 0.033 | 0.0019 |
| J.P. Morgan | 35 | 0.031 | 2 | 0.017 | -0.023 | 0.0067 | 0.021 | 1 | 0.051 | 0.019 | 0.0551 |
| Investec | 35 | -0.051* | 1 | -0.022* | 0.133* | 0.3375 | 0.512* | 1 | 0.018* | 0.036 | 0.0006 |
| HSBC | 33 | -0.017 | 2 | -0.012 | 0.027 | 0.0114 | 0.022** | 1 | 0.036** | 0.186 | 0.0015 |
| Macquarie | 32 | 0.036 | 2 | 0.021 | 0.034 | 0.3105 | 0.033** | 1 | 0.055** | 0.111 | 0.3612 |
| Goldman Sachs | 32 | -0.027** | 1 | -0.018** | 0.077 | 0.0003 | 0.046 | 2 | 0.041 | 0.032 | 0.0500 |
| Morgan Stanley | 29 | 0.041 | 1 | 0.025 | 0.072 | 0.0046 | 0.028** | 1 | 0.053** | 0.041 | 0.1146 |
| Avior Capital | 26 | 0.025** | 2 | 0.015** | -0.181** | 0.0011 | 0.057 | 1 | 0.024 | 0.057 | 0.4755 |
| ISS-EVA | 24 | -0.033 | 1 | -0.013 | 0.052 | 0.1233 | 0.044** | 2 | 0.033** | 0.125** | 0.3315 |

Note: Significance level of 1%, 5% and 10% are represented by superscript *, **, and *** respectively.

From the results above, we reject the null hypothesis as the intercept and the parameter for the AR component over both $\delta_2$ and $\delta_4$ variables are positive and significant at the 1% level, pointing towards the systematic overshoot forecast. Put differently, the results show that the bias observed is persistent over time and is not mean-reverting. To not reject the null hypothesis of zero and no auto-correlated prediction error, the null hypothesis would be captured by a zero (or not significant) value for the intercept (α) and a not significant autoregressive parameter. AR regressions was performed for three lags because beyond that there was limited explanatory benefits for the variables. We note from the results in table 5

above, there is bias in target price forecasting although we cannot determine from the results what causes such bias.

## 4.3 Target price accuracy and stock recommendation

We analyse the impact of three main categories of recommendation including Buy' Hold and Sell. Brav and Lehavy (2003) defined recommendations as qualitative version of target price, as a 'buy' recommendation is associated with positive implicit return, while a 'sell' recommendation communicates a negative implicit return.

In the section below, controlling for the implicit return effect, we evaluate prediction errors across the three recommendation classes. We regress $\delta_{2,}$j,i and $\delta_{4,}$j,i on three dummy variables representing 'Buy', Hold and 'Sell' on one variable (($TP_{t,j,i}/P_{t,j}$)-1) representing the implicit return in target prices at the time of report issuance.

**Table 6.**

**Target Price accuracy vs recommendations**

| | $\delta_2$ | | | $\delta_4$ | | |
|---|---|---|---|---|---|---|
| **Dependent Variable** | **Coefficient** | **T-stat** | **p-value** | **Coefficient** | **T-stat** | **p-value** |
| Intercept | 0.084 | 0.021 | 0.0059 | 0.057*** | 6.314 | 0.3224 |
| $TP_{t,j,i}/P_{t,j}$)-1 | 0.653*** | 83.452 | 0.1123 | 0.712*** | 15.36 | 0.0095 |
| Buy | 0.027 | 1.871 | 0.0551 | 0.062*** | 4.663 | 0.0364 |
| Hold | -0.036*** | -0.687 | 0.0399 | 0.054 | 17.115 | 0.1331 |
| Sell | 0.019*** | 1.230 | 0.1201 | 0.122*** | 6.551 | |
| | | | | | | |
| Adj $R^2$ | 0.542 | | | 0.366 | | |
| Std. error of estimate | 0.331 | | | 0.413 | | |
| F-statistic | 4.881*** | | | 10.312*** | | |
| Observations | 756 | | | 756 | | |

Note: Significance level of 1%, 5% and 10% are represented by *, **, and *** respectively.

We explain the above variables below:

$$\delta_{2,j,i} = \alpha + \beta_1((TP_{t,j,i}/P_{t,j})-1) + \beta_2 Buy + \beta_2 Hold + \beta_4 Sell + \varepsilon \quad (10)$$

$$\delta_{4,j,i} = \alpha + \beta_1((TP_{t,j,i}/P_{t,j})-1) + \beta_2 Buy + \beta_2 Hold + \beta_4 Sell + \varepsilon \quad (11)$$

where: $\delta_{2,j,i}$ and $\delta_{4,j,i}$ are prediction errors

: $(TP_{t,j,i}/P_{t,j} -1)$ measures the implicit return

: Buy, Hold and Sell are dummies taking a value of 1 if the Target Price is associated with a specific recommendation and 0 otherwise.

The F-static value of 4.88 for $\delta_2$ and 10.31 for $\delta_4$ suggest the statistical significance of the regressions is high, with adjusted $R^2$ of 54% and 36% respectively. The results show that, 'buy'

and ‘sell’ recommendation have larger impact on target price accuracy than the ‘hold’ recommendation. These findings confirm that the accuracy of target price decreases as the implicit return increases, in line with discoveries of Bradshaw and Brown (2006).

## 4.4 Target Price accuracy vs Earnings estimates

In this section, we investigate the association of accuracy in target price forecasting and accuracy in earnings estimates forecasting. Analysts develop complex financial models primarily to understand what underpins companies’ earnings so they can better forecast the likely changes going forward. These models filter through to valuation methodologies, including Discounted Free Cash Flow (DCF) used to compute target prices. We therefore expect that analysts that can accurately predict future earnings have a better chance of also accurately forecast the future market price (target price). With 2018 as the common estimation period, we recorded consensus earnings estimates deviations (calculated as the difference between the reported earnings and the consensus earnings) for all the companies in our sample. Figure 1 below illustrate that target price deviations are more frequent than earnings estimates deviations, implying analysts were better forecasting earnings than they were in forecasting target price. We also note that the largest earnings estimate captured was -198% for Impala Platinum (IMP) with 13% target price deviation. The largest target price deviation was 162% for Aspen Health care (APN) but recorded earnings estimates deviation of -7%. We further note that equal deviations in target price and earnings estimates occurred on PicknPay (PIK) at -5%. We therefore conclude there is no evidence of a relationship between earnings estimates accuracy and target price accuracy.

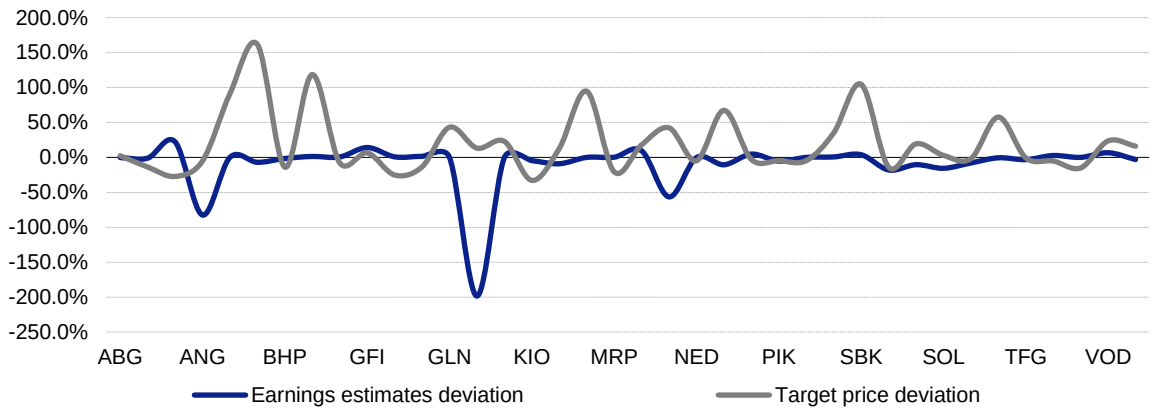



***Figure 1**. Earnings estimates vs Target Price*
*Source: Bloomberg*

## 4.5 Factors that affect target price accuracy

In table 8 below, we evaluate the impact of market related factors that affect the accuracy of the target price. As the same as earlier, ($TP_{t,j,i}$, $/P_{t,j}$)-1 is the Implicit return computed by the difference between the target price and the market price at time *t.* EPS is a dummy variable

taking on the value 1 if EPS consensus is positive and 0 otherwise. Top40 is a dummy variable represented by 1 if the company belongs to the JSE top40 index and 0 otherwise. Market capitalisation is the natural logarithm of the market value of the company at the beginning of the estimation period (1st January 2018). P/E is the market price of a share per its 1-year forward estimated earnings.

**Table 7.**

| **Market factors affecting Target Price accuracy** | | | | | | |
|---|---|---|---|---|---|---|
| | **$\delta_2$** | | | **$\delta_4$** | | |
| **Dependent Variable** | **Coefficient** | **T-stat** | **p-value** | **Coefficient** | **T-stat** | **p-value** |
| Intercept | -0.561*** | -15.624 | 0.3041 | -0.251*** | -5.592 | 0.0226 |
| $(TP_{t,j,i}, /P_{t,j})$-1 | 0.866*** | 33.413 | 0.0067 | 0.231*** | 2.361 | 0.0035 |
| EPS | -0.008** | 3.192 | 0.0179 | 0.004** | 0.675 | 0.4792 |
| Top40 | -0.065** | 0.022 | 0.0001 | -0.456** | 15.321 | 0.0312 |
| Market Capitalisation | -0.005*** | -6.130 | 0.0625 | 0.923*** | 8.751 | 0.0066 |
| P/E | 0.077 | 6.461 | 0.0077 | -0.034 | -16.667 | 0.0081 |
| | | | | | | |
| Adj $R^2$ | 0.492 | | | 0.321 | | |
| Std. error of estimate | 0.316 | | | 0.222 | | |
| F-statistic | 95.162*** | | | 77.159*** | | |
| Observations | 756 | | | 756 | | |

Note: Significance level of 1%, 5% and 10% are represented by *, **, and *** respectively.

It has been well documented that investor community is generally drawn to blue-chip stocks with high liquidity, above-average market returns and attractive trading multiples. Consequently, we expect target accuracy to be positively related to market capitalisation, P/E, EPS and Top40, as such shares have large following and uncertainty is relatively minimal. On the other hand, we expect target price accuracy to be negatively related to the implicit return as the more target price is set further from the current market price (upside or downside), the more the chances of realising such a target over the estimation period. To determine the impact of these variables on the forecasting ability of the target price, we run the following regressions:

$$\delta_{2,j,i} = \alpha + \beta_1((TP_{t,j,i}/P_{t,j})-1) + \beta_2 EPS + \beta_3 Top40 + \beta_4 Mrk\ Cap + \beta_5 P/E + \varepsilon \quad (12)$$

$$\delta_{4,j,i} = \alpha + \beta_1((TP_{t,j,i}/P_{t,j})-1) + \beta_2 EPS + \beta_3 Top40 + \beta_4 Mrk\ Cap + \beta_5 P/E + \varepsilon \quad (13)$$

where:

***($TP_{t,j,i}/P_{t,j}$ )-1)*:** Target price at time *t* and Market price at time *t* (we expect the sign not to be significant)

**EPS:** Dummy variable represented by 1 if consensus EPS is positive and 0 otherwise (we expect the negative sign as positive EPS signify better company prospects and attract investors thus prediction error should be limited).

**Top40**: Dummy variable taking on a value of 1 if a share belongs to the JSE Top40 index and 0 otherwise (we expect the negative sign as larger companies usually have greater analysts following, making the chance for prediction error slim)

**Market capitalisation**: Natural logarithm of the market capitalisation of each firm (we expect negative sign)

**P/E:** Price to earnings ratio. (we expect the sign to be negative as higher P/E ratios imply that investors are willing to pay more for future earnings and this is the case usually for companies that are well analysed and have limited uncertainty about their future operations making likelihood of large prediction error limited).

## 4.6 Results interpretation

The parameter representing implicit return has a positive sign and is large and is statistically significant, implying the wider the deviation from the target price and the market price at time *t*, the largely the resulting prediction error as expected. We further note that the observed errors are one-sided, which conflicts with the underlying assumption we made for formulating our null hypothesis, which is market prices randomly move with a drift. EPS parameter is negative and statistically significant suggesting firms that are expected to have positive earnings can be accurately predicted on how they will trade in the future. Interestingly, positive parameter capturing the impact of P/E is not in line with our expectation that companies with larger P/E multiples are well followed and understood by the investor community resulting in a better chance to accurately predict their future prices.

Regarding $\delta_4$ variable, we note that the sign on the EPS parameter is consistent in sign with that estimated in the $\delta_2$ regression but smaller in value; implying it is more challenging to accurately predict future multiples for loss-making companies as we expected. Lastly, P/E ratio has a negative sign and statistically significant which is in line with our expectations. This means that companies with higher P/E ratios are likely correctly priced in underlying value because investors understand their growth drivers and are willing to pay a premium for their earnings.

# Chapter five

## 5.1 Conclusion

In this paper, we investigated the predictive ability of target prices. We employed a unique approach and analysed consensus target prices as opposed to individual target prices; which majority of the literature revealed limited forecasting accuracy. Bonini et al. (2010) documented that, in their Italian stock market analysis, prediction errors were "consistent, auto-correlated and non-mean reverting. This motivated us into opting to explore how accurate analysts can be in aggregate. We achieved this main objective by studying the Johannesburg Stock Exchange listed companies using Bloomberg terminal as our primary source of data.

We formulated hypothesis that prediction errors resulting from target price accuracy should have a distribution with zero mean and a known variance and only deviates from the expected mean randomly. Our results are in contradiction to our expectations; as we found that prediction errors were consistently not zero, auto-correlated and not reverting to their mean. Multiple parameters explaining our variables had positive signs, implying there is systematic upward bias demonstrated by analysts in predicting future market prices.

Our second objective was to evaluate the relationship between earnings estimates accuracy and target price accuracy. We found that the largest earnings estimates deviation did not coincide with the largest target price deviation. We also noted that only one company from our sample had the same deviation of both earnings estimates and target price. We constructed a chart that illustrates that analysts generally did a better job predicting earnings than they did forecasting future market prices over the same estimation period. We therefore conclude that there is no relationship between earnings estimates and target prices.

Lastly, we followed statistical methodology developed by Bonini et al. (2010) to test for the impact of market-related variables on target price accuracy. Our results were generally in line with our expectations as the sign on the implicit return parameter was positive and statistically significant; confirming that, target prices that imply larger implicit returns have larger prediction errors. The positive sign on the parameter for P/E surprised us as we expected companies with higher P/E multiples to be fairly and accurately priced according to their underlying value, suggesting that forecasting their future prices would be relatively easy to get right, thus reducing the prediction error.

We suggest the following for future studies. Firstly, our results point towards existence of systematic upward bias and it would be interesting to investigate the sources of these biases. Secondly, capital markets in emerging environments are usually characterised by high growth

potential and wild volatility. In this kind of market, it is inherently challenging to accurately predict future market prices and we therefore suggest that in the future, our accuracy metrics should incorporate each company's volatility to minimise the impact of huge price swings. Moreover, we suggest expanding our data sources to include other financial data providers to capture wide audience of analysts.

Additionally, our sample only includes companies that have a following of more than ten analysts which biased our sample to companies with large market capitalisations that are dominated by institutional investors. Therefore, we recommend future studies to focus on small-to-medium capitalisations which have high ownership by retail investor because analysts are probably more incentivised to forecast accurately for large market capitalisation companies as institutional investors have equally-appropriate skills to conduct their own research. Again, institutional investors bring in more trading and investment business to stockbrokers which motivates sell-side analysts to be more accurate in their forecasting.

Lastly, following a series of governance failures in South African corporates lately, which results in huge shareholder value losses through drastic market price changes, it would be interesting to study analysts' accuracy on target prices, earnings forecast and stock recommendation in relation to companies' rating on Environmental, Social and Governance (ESG) which would assist investors to detect potential governance risks in companies they invest in.

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# Appendices

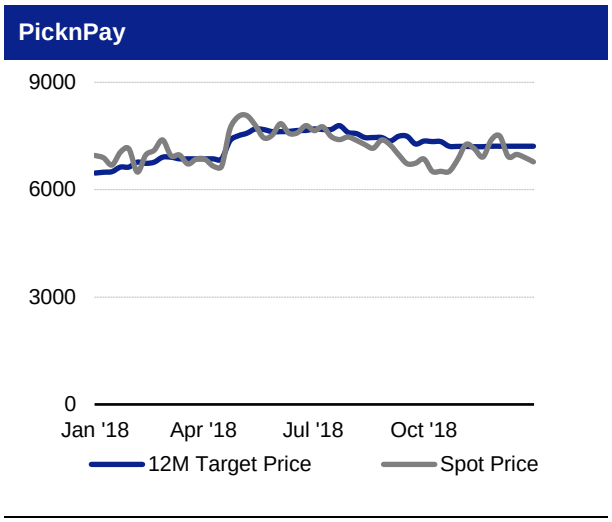



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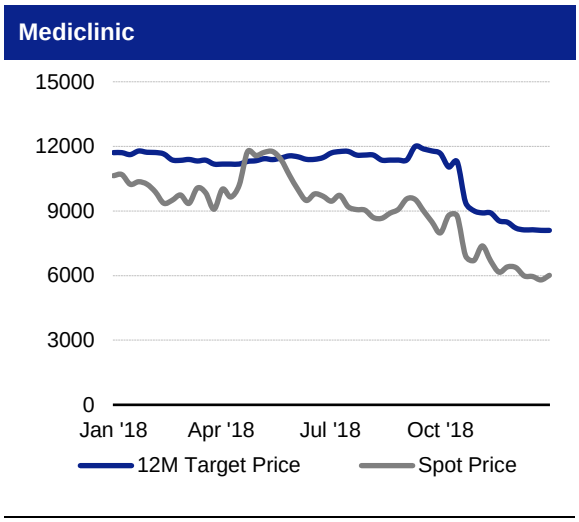



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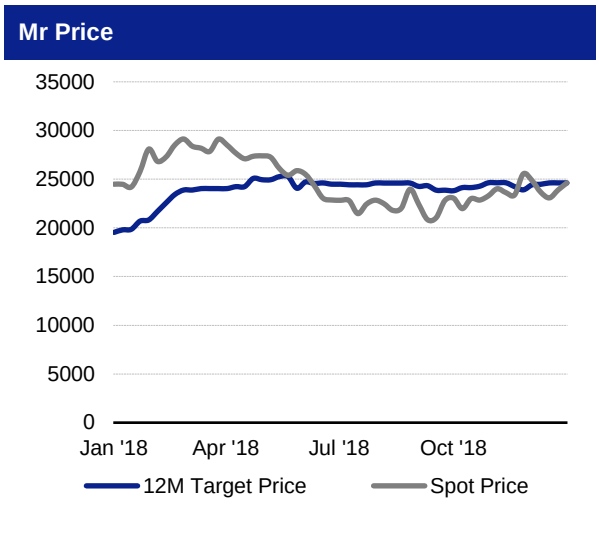



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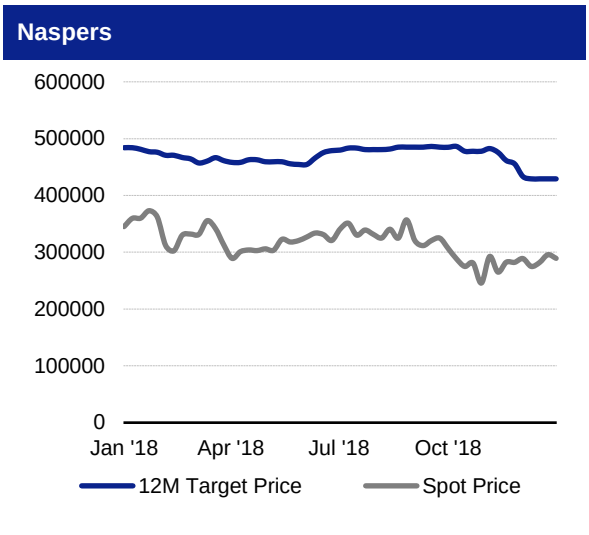



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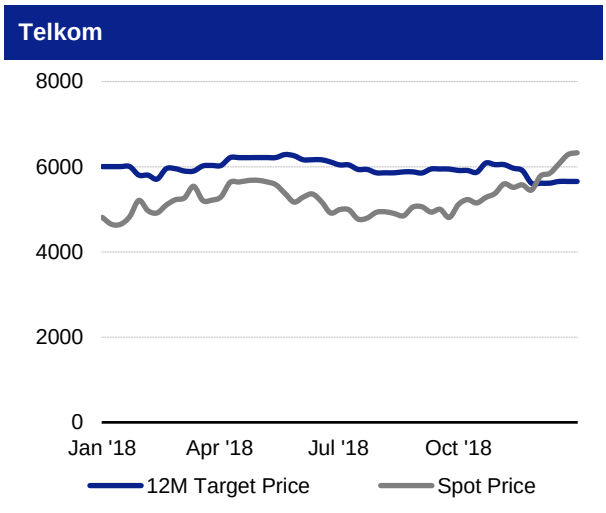



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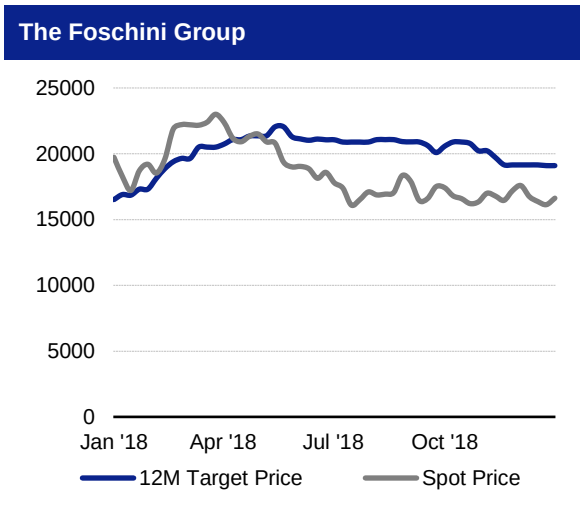



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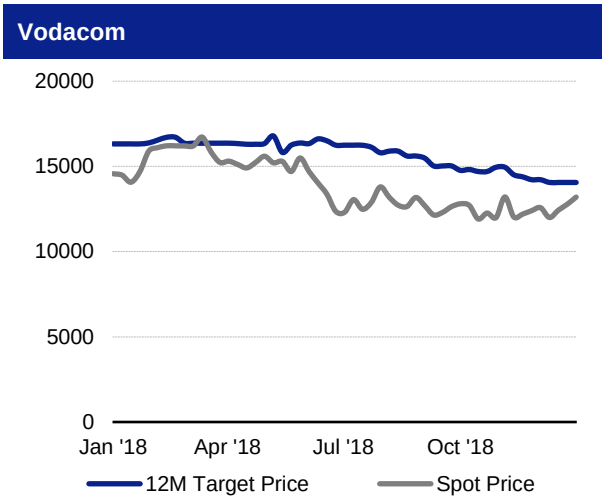



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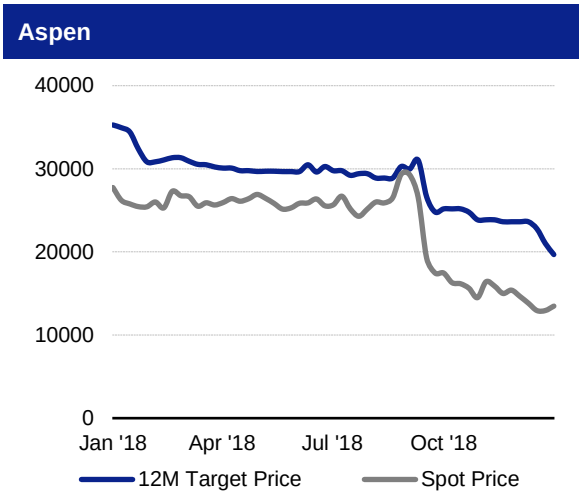



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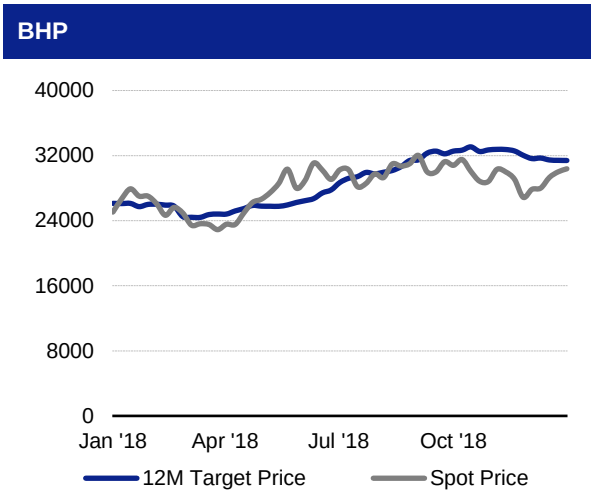



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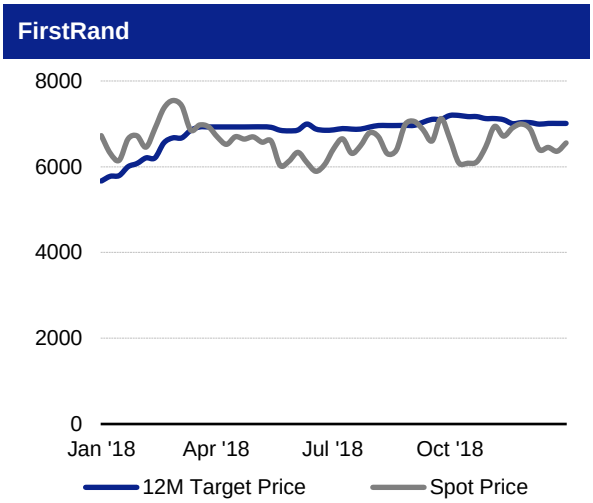
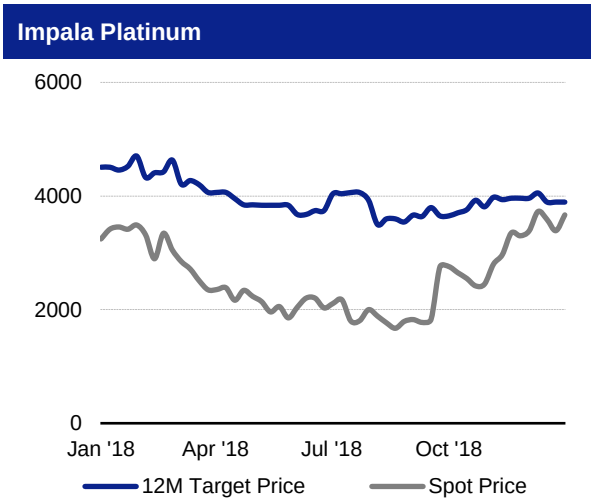
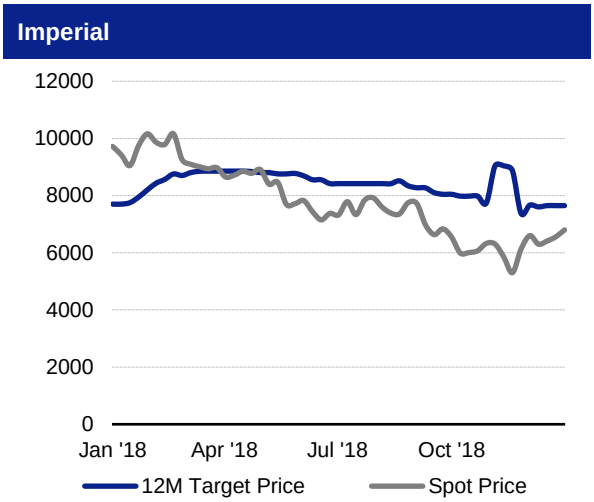



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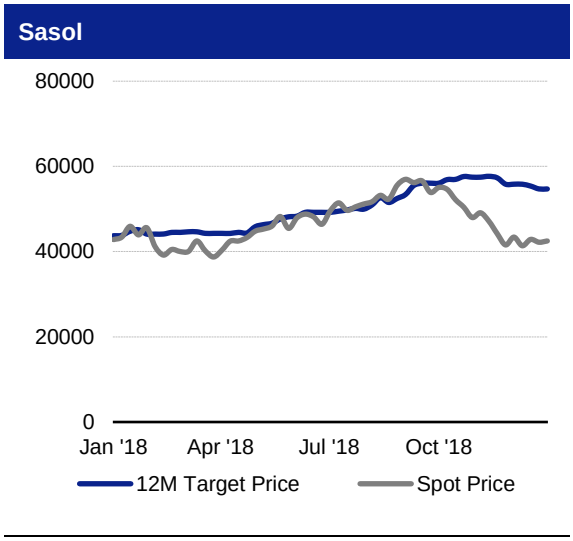



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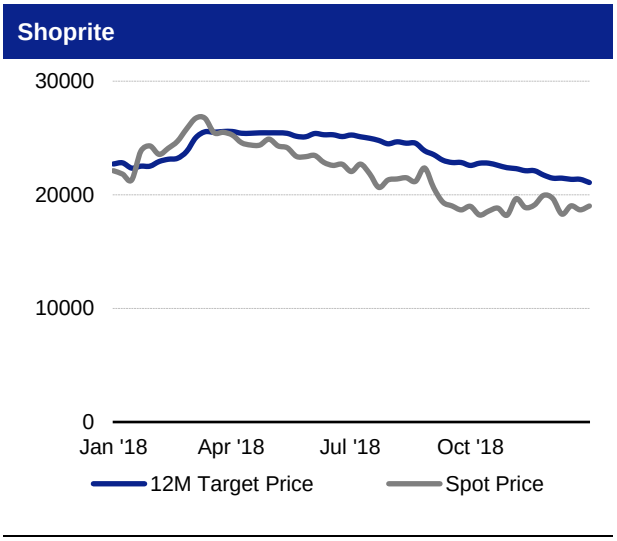



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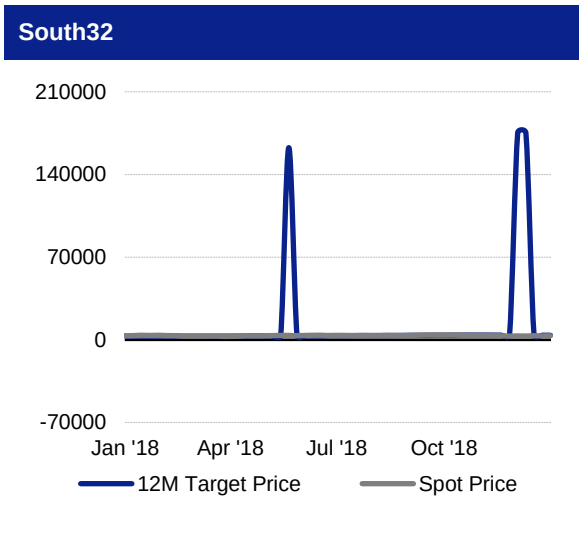



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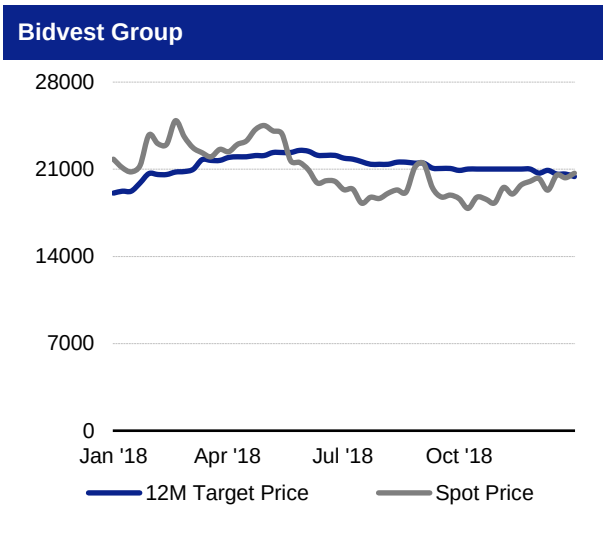



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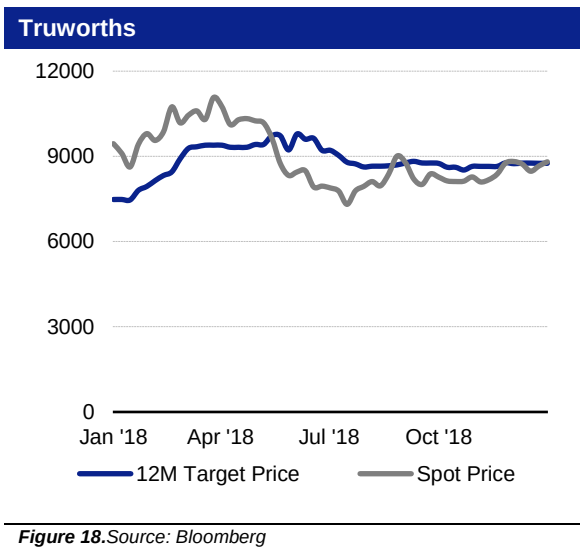



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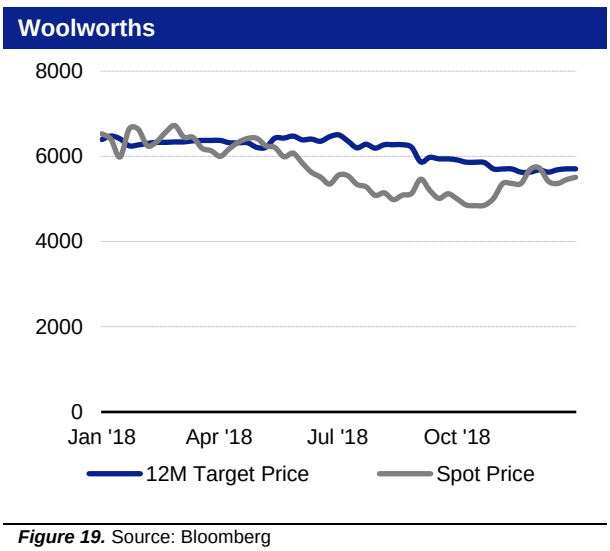



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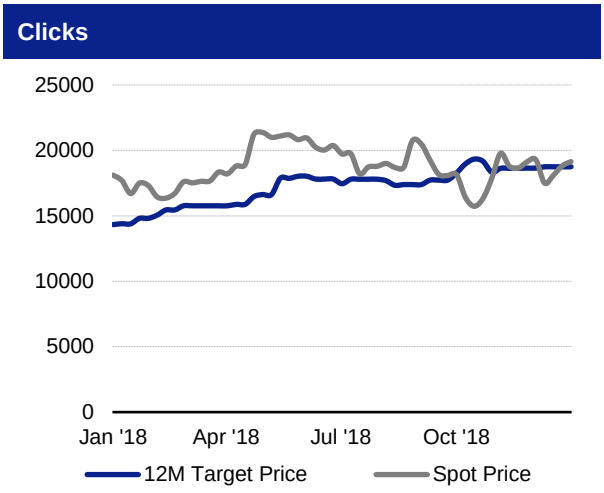



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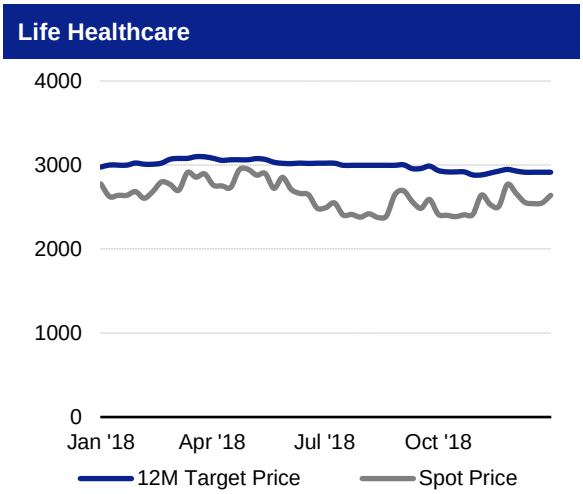



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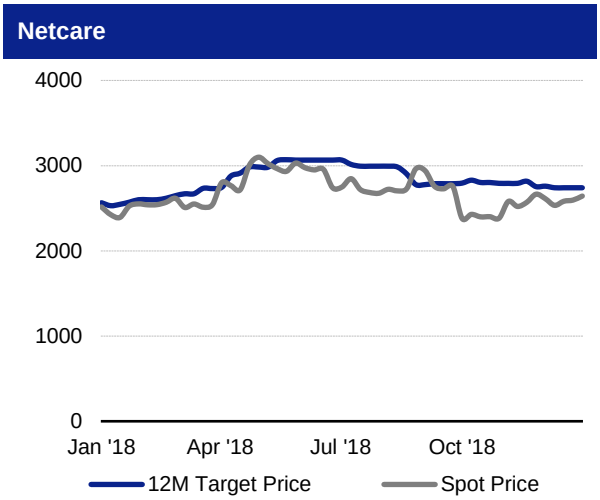



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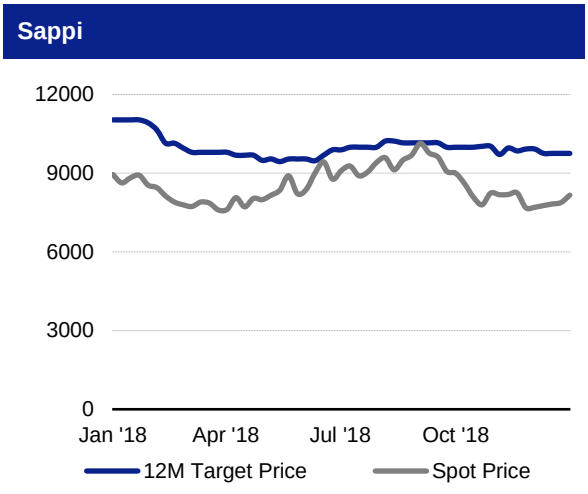



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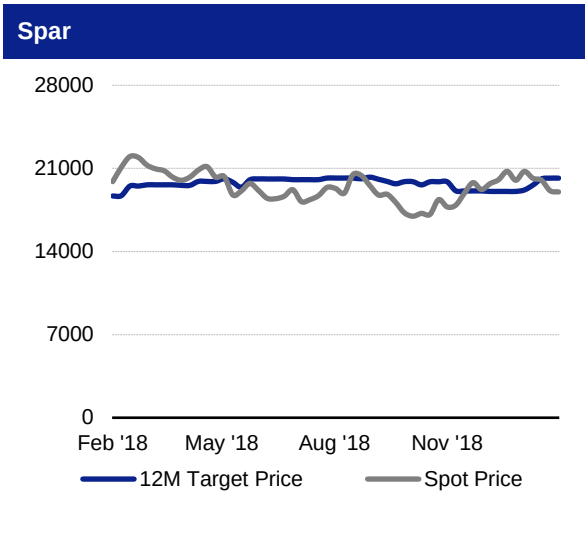



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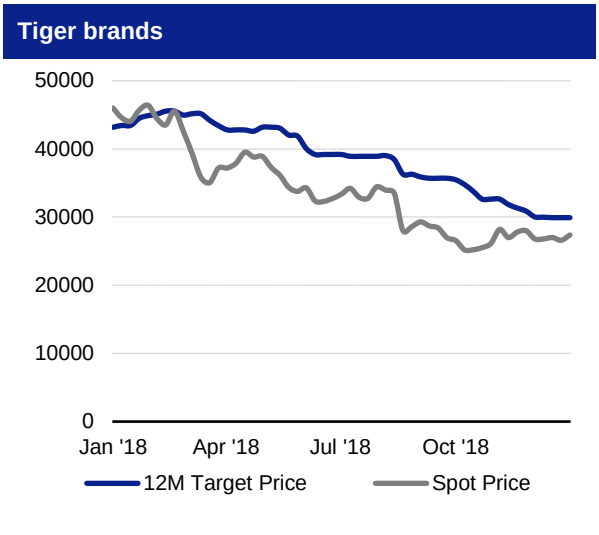



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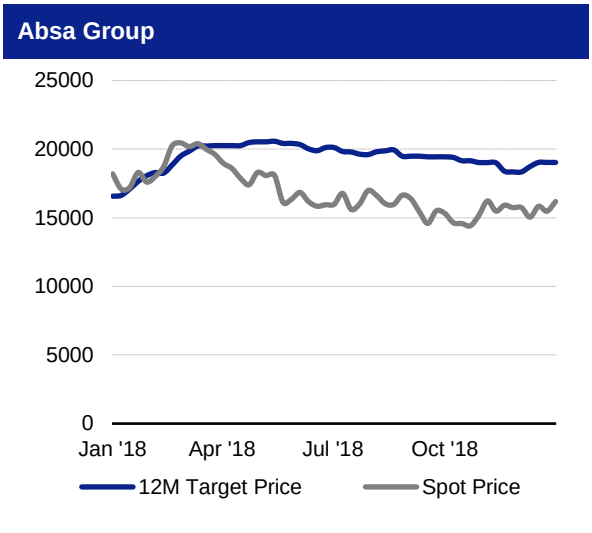



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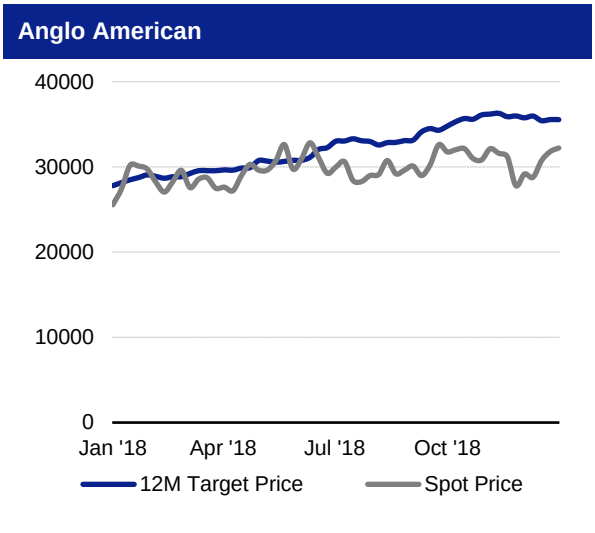



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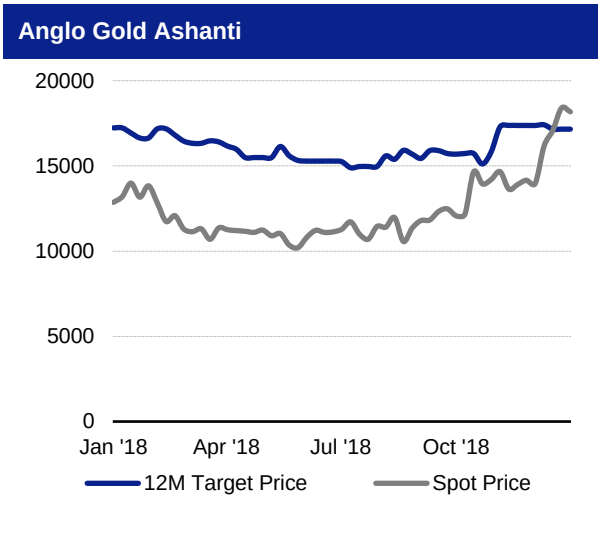



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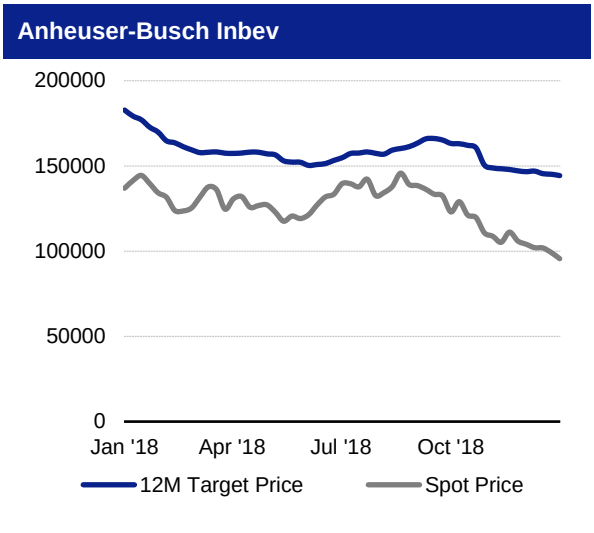



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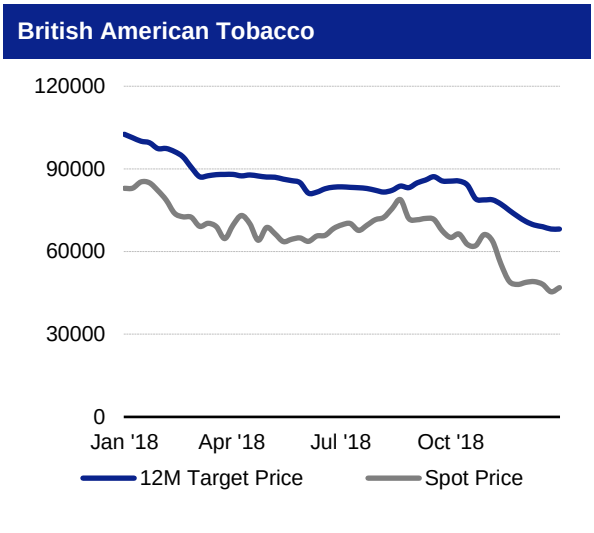



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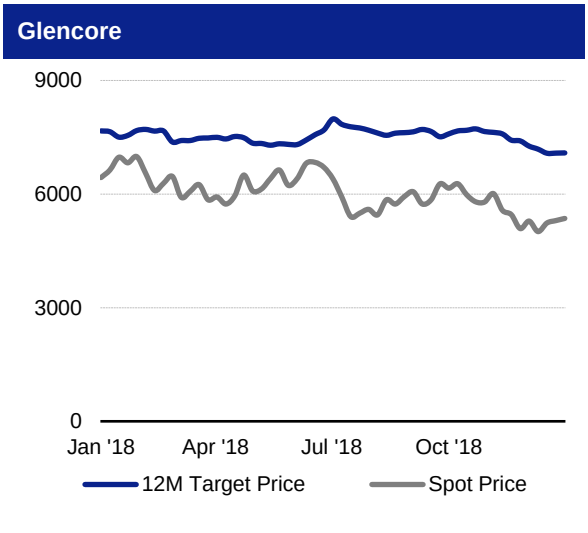



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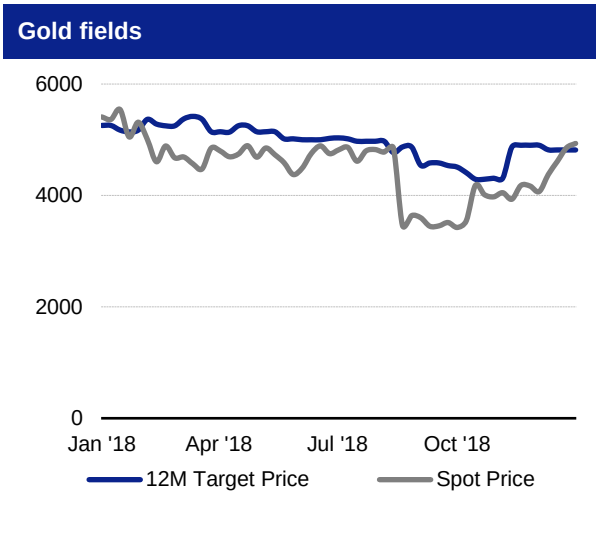



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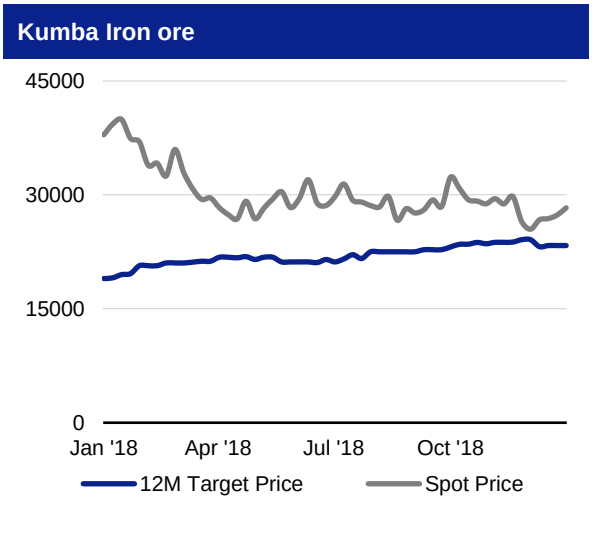



***Figure 34.*** *Source: Bloomberg*

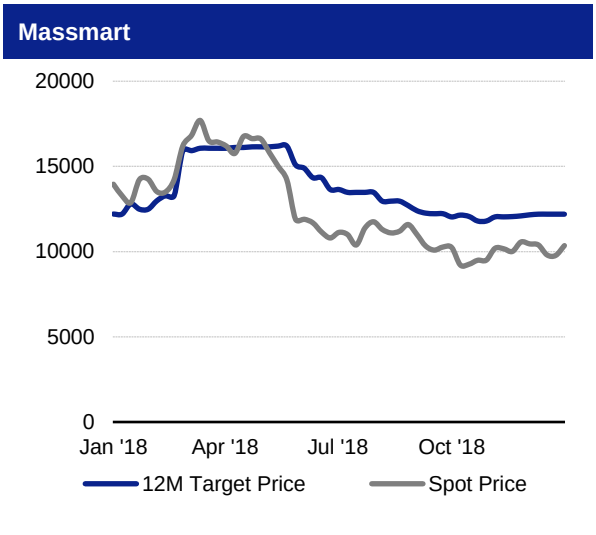



***Figure 35.*** *Source: Bloomberg*

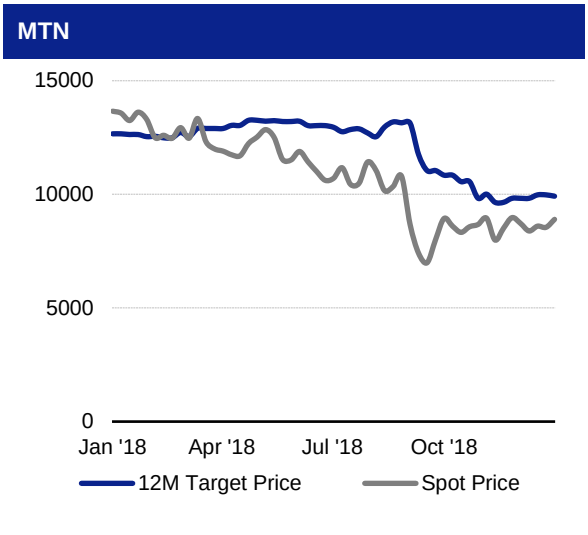



***Figure 36.*** *Source: Bloomberg*

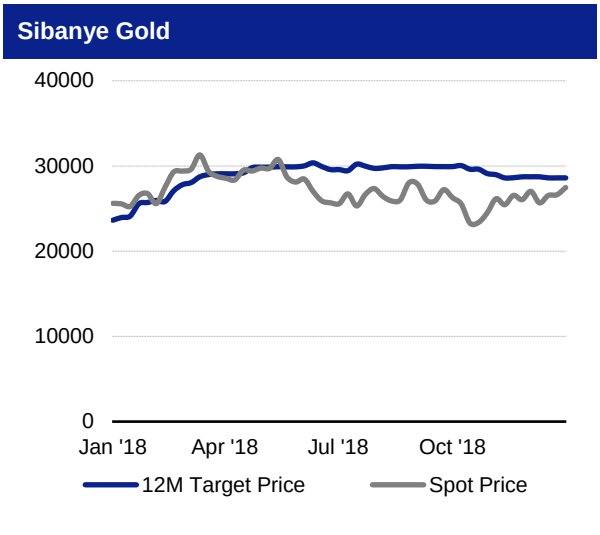



***Figure 37.*** *Source: Bloomberg*

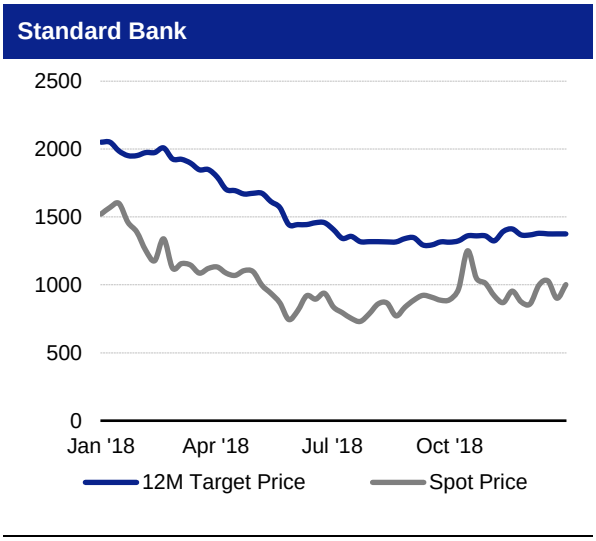



***Figure 38.*** *Source: Bloomberg*

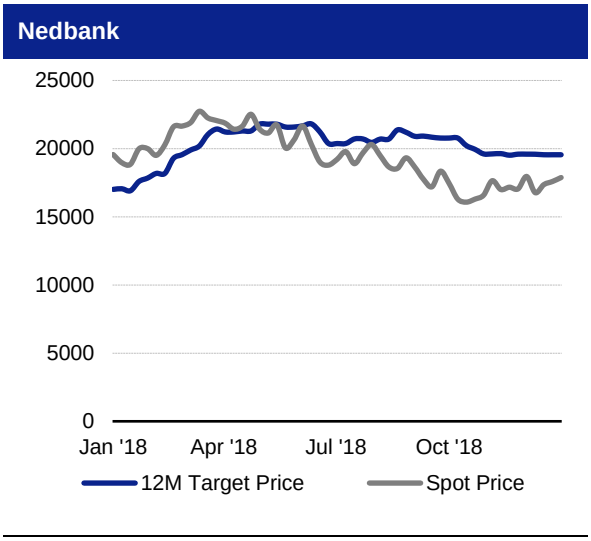



***Figure 39.*** *Source: Bloomberg*