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Secondary innovation and firm performance: A case study of JSE listed companies

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Abstract

Companies are always on the lookout for means to improve their performance for the benefit of their shareholders and other interested parties. Literature has shown that innovation through research and development (R&D) can be a catalyst for the performance of a company. Unfortunately, not all companies are able to invest in R&D, especially in emerging markets such as South Africa. Instead, some acquire patents and licenses (secondary innovation) to achieve the same goals. This study uses generalized method of moment (GMM) approach on a data set of companies listed on the Johannesburg stock exchange (JSE) between 2007 and 2021, to ascertain the impact that secondary innovation has on the performance of JSE listed companies. Our results suggest that the acquisition of secondary innovation has a positive impact on JSE listed firm. However, we found evidence that the South African government policies in relation to innovation hampers the performance of JSE listed companies.

Keywords: Secondary Innovation, firms' performance, South Africa

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1. Introduction

The purpose of a modern business enterprise is to maximise shareholders value and enhance the socio-economic status of the entire society (Madden 2017; Koslowski 2001; Sison 2016). In an environment of decreasing resources, companies have resorted to the use of innovation to enhance the ability to meet their primary goal, which is value creation for shareholders. Studies have proven that innovation drives growth (Al Naqbia et al. 2020; Soumonni and Ojah 2021), this underscores the importance of direct investment in innovation-enhanced activities. Companies that are not able to invest directly in innovation-enhanced activities could nevertheless invest in the creative adaptation of other people's innovation or secondary innovation so as to benefit their stakeholders. Secondary innovation relates to the appropriation of the outcome of research and development (R&D) conducted elsewhere, imported or endogenous, with the objective to enhance the production capacity of a company (Liao et al. 2020; Liu et al. 2019). The aim is to boost the growth of companies. Growth enables further innovation and the necessary structural changes that prepares a firm to challenge the market (García-Manjón and Romero-Merino 2012). This is because innovation entails using new ideas to help improve the status quo or brings to market a new range of goods and services.

Extant literature provides support for the role innovation plays in improving firms' performance. Atalay et al. (2013) studied the impact of innovation on the performance of 113 firms in the automotive sector of the Turkish economy and documented a significant and positive impact of technological innovation on the performance of the surveyed firms. In the same vein, Walker et al. (2015) found the management of innovation to positively affect performance while reviewing a number of publications on the subject. Similar results have been reported by Zhang et al. (2019); Blind et al. (2020); Chipeta and Muthinja (2018) and Ndesaulwa and Kikula (2016). The only dissenting voices are those of Yuan and Nishant (2021), who argue that investment in R&D have the potential of introducing a disorderly growth pattern that could negatively affect a company. Moreover, Yuan and Nishant argue that the effect of R&D on firm performance can be complex and chaotic, where they argue that R&D can increase product demand, which in turn boosts sales quantity. On the other hand, R&D increases production costs, which in turn reduces firm's profit margins. Therefore, the two forces induce complexity and volatility in revenue management, which requires attention to avoid unintended consequences. Overall, the literature supports the assertion that innovation has a positive effect on the performance of a company in varied settings.

South Africa serves as a backdrop to this study since the nation encounters endemic unemployment. The situation requires companies to grow and create opportunities to absorb the youth into rewarding employment ventures. One of the ways companies employ to mitigate this situation is by investing in R&D (Ulku 2004; Hall and Bagchi-Sen 2002; Mohnen 2019). However, this approach becomes challenging in emerging markets such as South Africa, due to the generally constrained financing environment (He et al. 2020). Even so, it is pertinent to study the South Africa investment in innovation (R&D), focusing on secondary innovation, and understand how it has promoted performance of South African, especially listed firms.

Innovation (secondary innovation) could also be as a result of activities that are not linked to any scientific process but more as an expression of creativity, inspiration, or the overall know-how of management of a firm that results in additional value creation (generally termed non-R&D innovation) (Xie et al. 2019; Thomä and Zimmermann 2020). Wu et al. (2009) describes secondary innovation as something acquired or adapted from processes developed elsewhere. The authors argue that secondary innovation is an opportunity for developing nations, such as South Africa, to catch up with more advanced economies. The expectation here is that developing economies could fast tract their development by importing and adapting innovation produced elsewhere. In this research, we quantify the impact of secondary innovation on the performance and growth prospects of firms listed on the Johannesburg Stock Exchange (JSE). The assumption is that companies listed on the JSE could make use of secondary innovation to drive their performance, therefore creating value for their stakeholders. Although studies have assessed the impact of innovation on the South African economy (Machaka 2018; Marule 2022; Manzini 2015), very little attention has been given to the impact of secondary innovation on the performance of JSE listed firms.

This study contributes firstly to the literature on the impact of secondary innovation on the market performance of listed companies. Additionally, the study found that the concept of secondary innovation is a means by which companies in developing countries could take advantage of R&D undertaken elsewhere to advance their prospects. To this end this study gives an insight on how secondary innovation could become a catalyst for value creation for listed firms in emerging markets such as South Africa.

The findings of this study perhaps will be of benefit to players in various industries; Firstly, to investors as it could assist them in the selection of potential investees based on their propensity to innovate. Secondly, it will assist policy makers to identify sectors that are less innovative so that targeted interventions are undertaken to encourage innovation.

2. Literature review and hypothesis development

The progress that humanity experiences today is as a result of incremental innovative undertakings that have shaped the way human being interacts with its surroundings. Most aspects of life are concerned with procurement of goods and services for human consumption. Like their peers all over the world, South African companies are at the forefront of the production of goods and services in the sub-region and arguably on the African continent. These goods and services are used in everyday life and are therefore the principal drivers of innovations in the country (Sutherland 2020).

Innovation refers to novelty in terms of a new product or process that is brought to the market (Aronson 2008; Kahn 2018). It is a multi-facets simultaneous undertakings that drives changes in the society (Kline and Rosenberg 2010). R&D is considered a popular source of innovation by firms (Palmberg 2006; Ramadani and Gerguri 2011; Lee et al. 2016). This is because it improves the competitiveness of a firm and ultimately leads to better financial performance(Artz et al. 2010; Ramadani et al. 2019). R&D investment leads to the development of goods and services that enhance the revenue of a company (Hartmann 2003). Lome et al. (2016) found R&D investment to shield firms from the erosion of revenue during a recession. The positive impact of R&D on revenue may vary between sectors of activities, for instance, Koutroumpis et al. (2020) found the ICT sector in the European Union to benefit more with improved revenue compared to other sectors of activity. Ultimately, research has shown that R&D activity leads to economic growth (Ulku 2004; Edquist and Henrekson 2017; Nair et al. 2020). This study postulates that an increase investment in R&D by companies listed on the JSE will not only improve their revenue but ultimately enhance their long-term growth prospects. However, R&D alone cannot fully account for innovation, this is because companies do not always have the necessary resources to engage in R&D, their need to innovate is fulfilled by the acquisition of patents and licenses developed elsewhere. This secondary innovation is also expected to have a positive impact on firms' performance (Thomä and Zimmermann 2019, 2020; Yanting et al. 2016).

Innovation drives activities in various sectors in varied ways. For example, Cox (2010) studied innovation in the education system in South Africa, Aronson et al. (2012) studies innovation in drug therapy and Meyers and Tucker (1989) studied innovation in logistics. In defining innovation, Gault (2018), is of the view that a single comprehensive definition of innovation, that caters for all sectors of activity is important because it will assist in highlighting the interconnectedness of various sectors and help in the measurability of innovation. This study discusses innovation in the context of its ability to enhance the performance and growth prospects of firms listed on the JSE.

Over and above all the techniques and methods described in extant literature as means available for managers to help improve the performance of a firm, innovation is touted by Kalmuk and Acar (2015) and Ramadani et al. (2019) as one of the critical elements to drive firm's performance to an upward trajectory. Extant literature describes the positive impact that innovation has on the performance of firms in various sectors of the business world. For example; Zahra and Das (1993) examine the impact of innovation on the financial performance of manufacturing firms in America. A total of 513 firms met their selection criteria and were surveyed on composite variables such as leadership orientation, process innovation, product innovation, internal or external sources of innovation, and the investment level for innovation activities. They found that commitment to manufacturing innovation leads to improved financial performance.

Bockova and Zizlavsky (2016) found similar results in their study of innovation in the manufacturing sector of the Czech Republic. Similar studies in different sectors of the economy and in separate jurisdictions have returned comparable results (Kafetzopoulos and Psomas, 2015); Xu and Wang, 2018; Hutahayan (2020). This study focuses on the impact of secondary innovation on the performance of listed companies on the JSE. This is important because the JSE is the premier stock market on the African continent and understanding the determinants of the performance of listed firms could serve as a model for smaller stock markets across the region. The performance is

measured by the variation in revenue, or the growth prospects of a firm represented by Tobin's Q.

Literature suggests a positive relationship between firm's revenue and growth prospect and the implementation of some innovative initiatives in its revenue generation process (Hall 2011; Kogan et al. 2017; Demirel and Danisman 2019). We expect similar results when assessing the impact that secondary innovation has on the performance of firms listed on the JSE. This is because we believe that secondary innovation activities by a company are likely to have a positive impact on the revenue and growth prospects of firms listed on the JSE. Further, secondary innovation is an opportunity for companies in developing countries to catch-up with their counterparts in more advanced economies (Wu et al. 2009). This is possible because firms in developing countries can by virtue of acquiring patents and licenses adapt advances made elsewhere to their local conditions, thereby benefiting their customer base and increasing shareholders value. Wu et al. (2009) asserts that the concept of secondary innovation is dynamic and progressive and therefore can be a catalyst of further innovation. Continuous innovation results in capacity building which leads to value creation in the long run (Petti et al. 2019).

Secondary innovation can be expressed in several ways. Firstly, imitation-innovation described by Hu (2018) as the ability of a company to invest resources in adapting a pioneering innovation, in such a way that a novel product or process is created that gives a comparative advantage to the innovator. This in essence is a state of mind that leads to the improvement of an initial innovation. The expectation is that this imitation do not become outright plagiarism but done within the confine of the respect of relevant copyright law (Hwang et al. 2016; Campi et al. 2019; Neves et al. 2021). The imitation process could be an effective way to catch up with the trends in the specific industry (Petti et al. 2019). And this will in turn improve the financial outlook of a company (Liao et al. 2020). Secondary innovation could also be because of "second order innovation". Second order innovation entails a radical shift in the way a product or a process is presented or undertaken (Agélii Genlott et al. 2019; Carradore et al. 2020). This is disruptive in nature and have been mainly observed in the high-tech environment. Generally, innovation in a corporation reflects how companies use their knowledge base to keep on improving their value proposition and therefore their financial performance. Secondary innovation is not a blatant plagiarism, companies therefore acquire right to products or processes by purchasing patents or licenses from the original innovators (Petti et al. 2019; Simelane 2013).

This study limits itself to the secondary innovation, proxied as brand, patents and licenses (Burhan et al. 2017; Leiponen 2006; Cabaleiro-Cerviño and Burcharth 2020; Andonova and Losada-Otálora 2020), disclosed in JSE listed companies' annual financial statement. The international financial reporting standard framework give guidance on the requirement for the disclosure of the items relating to brand, patents and licenses under the standard that deals with intangible assets(Nichita 2019; Tunyi et al. 2020; Barker et al. 2021).

3. Data and Methodology

3.1 Data and data sources

The data for this study is collected from JSE listed companies for a period of 15 years starting in 2007 to 2021. The choice of the JSE for this study is motivated by its relative sophistication compared to other emerging market stock exchanges. Also because of the likelihood for listed companies to disclose brand, patent and licenses data which is the proxy for secondary innovation for this study. The study focuses on the impact that secondary innovation has on the performance of a listed firm. Performance is considered at operational level, proxied by the revenue (Huang, Marquardt, & Zhang, 2015; Crandall, 2010) as we expect secondary innovation to increase (decrease) revenue. The potential for companies' growth proxied by Tobin's Q (Fu et al. 2016); this is because we expect acquisition of patent and licenses to accelerate the growth of a firm. Expenditure on brand, patents, and licenses is collected from annual financial statements as a proxy for secondary innovation (Liao et

al. 2020; Liu et al. 2019). Moreso, one of the ways to for companies to create opportunities to alleviate unemployment is by investing in innovative ideas through R&D (Ulku 2004; Hall and Bagchi-Sen 2002; Mohnen 2019). The study controls for other factors that can affect companies' revenue and investment including the size of the company (Total Assets), return on asset (ROA), leverage (debt). This is because bigger firms are more likely able to have the resources to acquire patent and licences than smaller firms. It has been affirmed that similar studies on firm performance deployed similar controls (Godspower-Akpomiemie, and Ojah, 2017; Huang, Marquardt, and Zhang, 2015; Crandall, 2010) The data used for the study were collected from Refinitiv DataStream, except for the measure of the percentage of R&D to GDP that was collected from the World Development Indicators compiled by the World Bank data. Tobin's Q was calculated as market capitalisation minus total debt, divided by total asset. Table 1 describes the variables used for the study and the expected signs.

Table 1. Description of variables

Variables		Description	Expected sign
Performance			
Revenue	Rev	Net revenue as disclosed by the company. In this study Rev captures the short-term effect of the company investment in secondary innovation (Huang, Marquardt, and Zhang, 2015; Crandall, 2010).	+
Tobin's Q	TQ	Ratio of (market capitalisation less debt)/total assets (Fu et al. 2016). This captures the long sustainability of the company.	+
Innovation			
Secondary Innovation	Inno	This is a dummy of 1 when a company discloses the monetary value of patents and licences capitalised by the company in its financial reports. This captures the secondary innovation of the company (Ulku 2004; Hall and Bagchi-Sen 2002; Mohnen 2019)	+
Control Variables			
Total Assets (size)	Size	Total assets of the company disclosed in a company's financial reports. It is a control variable, capturing the size of the company under review.	+
Return on Asset	ROA	Return on assets, collected from Refinitiv. It is a control variable in the model to capture other effects on company's performance.	+
Leverage	Debt	Total debt disclosed in a company's financial reports. . It captures the risk the company is exposed to	–
R&D % expenditures to GDP	R&D	The percentage of a country's GDP spent on research and development (Yuan and Nishant, 2019). It captures the effect of national investment on R&D on the company's performance (Rev and TQ).	+

Source: Compiled by author

3.2 Estimations

The initial estimation, after some descriptive analysis of the variables of interest, is meant to assess the impact of secondary innovation on the revenue of JSE listed firms. Extant literature suggests that revenue benefits from firms' innovation. For instance Hall (2011) found product innovation to have a substantive positive impact on firms revenue. In different contexts and using various proxies for innovation, researchers have articulated the positive impact that innovation may have on firms' revenue (e.g., Mai et al. (2019); Latifi et al. (2021)). However, these is also a school of thought that asserts that benefits firms derived from innovation may not be significant in some instances. Because of what seems to be an inconclusive debate on the impact of innovation on the performance of firms, we run the following equation:

$$REV_{it} = \alpha_{it} + \alpha_0 REV_{it-1} + \alpha_1 INNO_{it} + \alpha_2 SIZE_{it} + \alpha_3 ROA_{it} + \alpha_4 RISK_{it} + \alpha_5 R\&D_{it} + \varepsilon_{it} \quad (1)$$

Where REV_{it} is the revenue of firm I at year t. $INNO_{it}$ is a dummy variable equal to 1 if a firm discloses data relating to secondary innovation and 0 if not. $SIZE_{it}$ is the size of firm i at year t,

measured by its total assets. ROA_{it} is the return on assets of firm i at year t. the $RISK_{it}$ is a measure of risk of firm i at year t proxy by the amount of total debt. $R\&D_t$ measures the percentage of expenditure on research and development to GDP for South Africa at year end and ε_{iit} is the error term.

Secondly, because we believe that the purpose of innovation is to enhance the long-term growth prospect of a company, we run the following estimation using Tobin's Q as our proxy for long-term growth prospect.

$$TQ_{it} = \alpha_{it} + \alpha_0 TQ_{it-1} + \alpha_1 INNO_{it} + \alpha_2 SIZE_{it} + \alpha_3 ROA_{it} + \alpha_4 RISK_{it} + \alpha_5 R\&D_{it} + \varepsilon_{it}$$

The study has purposefully split the JSE listed companies into two groups: the manufacturing sector on one side and the rest. The above estimations are repeated for each identified sector of activities to assess which one of them is more sensitive to our proxy for secondary innovation. The generalised method of moment (GMM) is the study's preferred estimation. This assist in dealing with inherent endogeneity in accounting and finance data. This is because GMM based estimators are most reliable in the presence of endogeneity and heteroskedasticity in the data (Arellano and Bond 1991; Arellano and Bover 1995).

3.3 Descriptive statistics

Table 2 presents the descriptive statistics for all the variables used in the estimation. It can be observed that there is a big variation in the revenue collected by JSE listed companies over the period of the study. This is illustrated by the size of the standard deviation. On average the JSE listed companies are viable as the mean of Tobin's Q is above 1. The standard deviation is around 1.25% this suggest that the standard JSE listed company Tobin's Q deviates from the mean by about 1.25%. Considering the proxy for secondary innovation, it is observed that a wide variation in expenditure relating to brand patents and licenses.

Table 3 presents the correlation matrix. We observe a positive relationship between revenue and secondary innovation, while a negative correlation exists between Tobin's Q and secondary innovation. However, all the other variables except for risk show a positive correlation with secondary innovation. A negative correlation also exists between Tobin's Q and risk.

Table 2. Descriptive statistics

Panel A: Financially Constrained Firms					
Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Revenue	554	2655273	3670659	1340000	21100536
Tobin's Q	554	1.2265	1.2592	-0.7704	8.6424
Assets	554	2605461	4721461	3486	3561275
Debts	554	604726.8	1293964	0.0000	12738786
Secondary Innovation	554	194295.3	735479.3	0.0000	7970507
ROA	554	9.7175	11.2965	-78.4900	123.2600
% R&D to GDP	554	0.7768	0.0762	0.6200	0.8981

Source: Compiled by author

Table 2 displays the descriptive statistics of the variables of interest, which shows that the data used contains 554 observations, Tobin's Q and ROA displaying the best fit of not deviating too far from the mean. R&D to GDP also displayed relatively good fit, with mean, min and max of 0.78, 0.62, and 0.89, respectively.

Table 3. Pearson correlation table

Correlation	Revenue	Tobin's Q	Assets	Debts	Secondary innovation	ROA	%R&D to GDP
Revenue	1						
Tobin's Q	–0.0486	1					
	(0.2536)						
Assets	0.7487	–0.0412	1				
	(0.0000)	(0.3328)					
Debts	0.6199	–0.1427	0.7848	1			
	(0.0000)	(0.0008)	(0.0000)				
Secondary Innovation	0.3264	–0.0958	0.5673	0.7508	1		
	(0.0000)	(0.0241)	(0.0000)	(0.0000)			
ROA	0.0023	0.4845	0.0236	–0.0788	–0.0692	1	
	(0.9566)	(0.0000)	(0.5784)	(0.0637)	(0.1036)		
% R&D to GDP	0.0486	0.0219	0.0099	–0.0060	–0.0169	0.1280	1
	(0.2527)	(0.659)	0.8151)	(0.8873)	(0.6902)	(0.0025)	

Table 3 displays the correlation matrix of the variables of interest, where a positive and significant relationship exist between secondary innovation and company revenue. As well as negative relationship between secondary innovation and R&D (research and development). These relationships are further confirmed with the GMM regression results in table 4.

4. Empirical findings

4.1 Sensitivity of firms' revenue to disclosure of secondary innovation data

Model1 presents the relationship between revenue and innovation. The purpose of this estimation was to determine if the revenue of JSE listed companies is sensitive to the disclosure of secondary innovation expenses. The GMM results in Table 4 – Model 1 shows the relationship between revenue and the dummy variable, representing our proxy for secondary innovation, (with a value of 1 if a firm discloses secondary innovation data and 0 if not), which is positive and significant (p-value<0.05). This gives credence to extant literature that suggests that secondary innovation has a positive impact on the revenue of listed companies. This confirms the positive correlation between revenue and secondary innovation in Table 3. This also attests to the fact that acquiring secondary innovation from elsewhere have a positive impact on the productivity of a firm and therefore boost the revenue of JSE listed companies.

Further, the percentage of R&D expenditure to GDP is negative and significant in explaining the revenue of JSE listed companies (p-value<0.05), which is also confirmed in the correlation matrix in Table 3. This outcome is important as it suggests that the R&D policy of the country could be counterproductive for listed companies. The GMM model also returns a positive and significant relationship between the lag of revenue, the firm size, and the firm's ROA on one side and the revenue on the other. Sargan test and its P-Value are at acceptable threshold, attesting to the reliability of the model.

4.2 Sensitivity of firms' long-term prospect to secondary innovation

Table 4 – Model 2 assesses if secondary innovation has an impact on the long-term prospect of a firm, which is measured as Tobin's Q. The GMM estimation shows a positive and significant relationship between our proxy for secondary innovation (dummy variable) and Tobin's Q, which is the proxy for long term viability of a company. Though this is contrary to the correlation between the two variables in Table 3, but the margin of the correlation is not evident (at less than 10%), to counter the relationship displayed in the GMM result. From Table 4, model 2, it is also found that the percentage of research and development (R&D to GDP) is significant but negative in explaining the growth prospect of a JSE listed firm. This result is counter intuitive as it would have been expected that R&D

efforts at government level would yield positive returns for listed companies. The Sagan test and its P-Value are within the acceptable parameters; therefore, the model is reliable.

Table 4. Effects of innovation on firms' revenue and long-term prospect.

	Model 1	Model 2
Variables	Revenue	Tobin's Q
Lag Revenue	0.023[b]	
	(0.011)	
Lag Tobin's Q		0.076[a]
		(0.009)
Dummy Inno	0.055[a]	
	(0.019)	0.448[a]
		(0.095)
Size	0.711[a]	
	(0.013)	–0.431[a]
		(0.046)
ROA	0.088[a]	
	(0.005)	0.173[a]
		(0.021)
Debt	–0.001	
	(0.007)	–0.190[a]
		(0.031)
R&D to GDP	-0.132[a]	
	(0.026)	–1.148[a]
		(0.164)
AR1	0.104	0.273
AR2	0.816	0.160
Sargan test	76.820	70.784
Sargan(P-Value)	0.149	0.290

Table 4 displays the GMM regression results on effect of innovation on firms' revenue and long-term prospect. a, b & c = 1%, 5% & 10%; the standard error is in parenthesis

4.3 Additional analysis

Subsequently, the dataset was split into 2 groups. The first group is made of companies in the manufacturing sector while the second group represents the rest of the companies (mostly services companies) excluding those in the financial sectors. Table 5 presents the results of the GMM regressions of equations 1 & 2 applied to both subsets of the dataset.

Interestingly, the acquisition of patents and licenses (secondary innovation) appears to have a significant negative impact on the revenue of manufacturing companies listed on the JSE. However, secondary innovation has a positive and significant impact on the firm's future prospect as can be observed by the coefficient of Tobin's Q. From the result, it can be argued that in the short run, the acquired innovation has a negative impact because the company may still be learning to integrate it in the manufacturing process, thereby having a negative impact on the current year's revenue.

Table 5. Effects of innovation on firms' revenue and long-term prospect according to groups.

	Manufacturing Model 1	Manufacturing Model 2	Non-Manufacturing Model 3	Non-Manufacturing Model 4
Variables	Revenue	Tobin's Q	Revenue	Tobin's Q
Lag Revenue	0.167[a]		0.002	
	(0.031)		(0.004)	
Lag Tobin's Q		0.355[a]		(0.006)
		(0.016)		0.079[a]
Dummy Inno	–0.096[a]	0.307[a]	0.072[a]	0.586[a]
	(0.025)	(0.067)	(0.008)	(0.087)
Size	0.770[a]	–0.047	0.706[a]	-0.420[a]
	(0.022)	(0.109)	(0.012)	(0.049)
ROA	0.071[a]	0.076[a]	0.069[a]	0.217[a]
	(0.011)	(0.016)	(0.002)	(0.011)
Debt	–0.042[c]	–0.092[a]	–0.036[a]	–0.219[a]
	(0.022)	(0.031)	(0.006)	(0.025)
R&D to GDP	–0.167[b]	–0.634[a]	–0.118[a]	–1.483[a]
	(0.075)	(0.063)	(0.019)	(0.147)
AR1	-	-	0.142	0.127
AR2	-	-	0.116	0.208
Sargan test	27.849	29.363	76.438	60.546
Sargan	0.366	0.249	0.156	0.633

Table 5 displays the GMM regression results on effect of innovation on firms' revenue and long-term prospect according to groups. a, b & *c = 1%, 5%* & *10%*

However, when the company fully integrates the acquired innovation, such innovation will have an effect to boost the company's prospects on the long run.

The results for non-manufacturing (models 3 and 4) show that acquisition of patents and licenses have a significant and positive impact in the short and long run. Because the non-manufacturing group is mostly services sector, therefore, any innovation is presumed to have immediate pull on the revenue, this explains the fact that secondary innovation has a positive and significant impact on the firm's revenue and as well as on the long-term prospect of the firm (Tobin's Q).

When bringing in control variables, it can be observed that ROA and firm size have positive and significant relationship with revenue and Tobin's Q throughout, except for the negative and significant relationship that size has with Tobin's Q in both sectors. Risk is negative and significant throughout. What is puzzling is that the percentage of R&D to GDP (a measure of government R&D efforts) is consistently negative and significant across board. It could have been expected that this relationship will be positive because of the assumption that the national government innovation effort will rob-off to the company and therefore enhancing individual company's revenue and growth prospects.

5. Summary and conclusion

This study set out to contribute to the discussion on the impact that the acquisition of secondary innovation has on the short term and long-term prospect of a firm listed on the Johannesburg Stock Exchange (JSE). The study used a sample of 155 companies listed on the JSE for the period 2007 to 2021. The panel GMM technique was applied and the results show that companies listed on the JSE could benefit immensely by acquiring and adapting innovation from elsewhere to enhance their value creation prospects. In the short run, manufacturing companies will have to exercise a bit of

patience as the effect of secondary innovation will take time to manifest.

However, it is important that the government assesses the impact of its innovation expenditure on the economy as the sample of this study seems to suggest that the investment on innovation activities by government adversely affects JSE listed companies' ability to increase their revenue in the short-term, but also negatively affect their long-term prospects. It is therefore recommended that the government should thoroughly revisit and review its innovation policies and expenditure, to ensure positive impact on the economy. In conclusion, we recommend that further research can be extended to other emerging market countries to assess the impact of government expenditure on innovation on the economy. Moreso, it will be imperative to know how other emerging market companies use secondary innovation to effect value creation.

Conflict of interest

The authors declare no conflict of interest.

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