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Impact of export promotion and market development on social welfare in South Africa: Evidence from the agricultural sector

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South Africa's industries in the agricultural sector spend some of the statutory levy income on export promotion and market development (EPMD) activities. Some industries argue that statutory levy expenditure on EPMD activities generates satisfactory returns on investment but empirical evidence is yet to be presented to support the argument. Hence, this study filled this gap by building a unique data set based on statutory levy expenditure on EPMD for four industries (citrus, deciduous fruits, table grapes and wine) and used econometric analysis to assess the impact of EPMD on social welfare over a 10-year period (2006–2015). Furthermore, we estimated the returns generated on social welfare per rand of statutory levy expenditure. In the analysis, we controlled for unobserved heterogeneity, multicollinearity and reverse causality. The results suggest that statutory levy expenditure on EPMD has a statistically significant positive impact on social welfare across the four industries. On average, a unit increase in statutory levy expenditure on EPMD leads to an improvement in social welfare ranging between 0.2% and 0.4% depending on the industry. In addition, the results suggest that 1 rand spent on EPMD for the four industries in question, on average, generates a US$26 worth of improvement in social welfare. Conclusively, statutory levy expenditure on EPMD played a key role in enhancing social welfare improvement. Therefore, there is a need to mobilise more resources to facilitate the EPMD initiative into new markets and products for the industries.

Introduction

Problem statement

Following the establishment and approval of statutory measures as provided for by the *Marketing of Agricultural Products Act*, No. 47 of 1996 (MAP Act), industries through the administrator bodies oversee the implementation of various statutory measures (i.e. registration, records and returns, and levies). Although the former measures (registration, records and returns) are very important in the administration and inspection of the latter, this study focuses only on statutory levies paid by stakeholders depending on the nature of the industry. By definition, a statutory levy refers to a charge per unit of an agricultural commodity at any point in the marketing chain between the producer and the consumer, collected for specific functions such as export promotion and market development (EPMD), quality control, research, transformation, etc. (National Agricultural Marketing Council [NAMC] 2015).

Over the years, about 15% of the statutory levy expenditure has generally been allocated for EPMD, particularly for the citrus, deciduous fruits, fynbos (proteas), potato, table grapes, wine and winter cereals industries. Empirical literature (Hayakawa, Lee & Park 2014; Lederman, Olarreaga & Payton 2010; Olarreaga, Sperlich & Trachsel 2016) indicates that expenditure on export promotion fosters export growth; however, such studies focus on export promotion agencies (EPAs) and expenditure sourced from the government. In the case of South Africa, previous studies (Boonzaaier 2015; Mashabela & Vink 2008; Mather 2003; Ndou & Obi 2013; Van Rooney, Esterhuizen & Stroebel 2011) clearly articulate the factors influencing the competitiveness of some of the above-mentioned industries, but they do not address how statutory levy expenditure on EPMD impacts trade – most importantly how the impact varies across industries, let alone the overall social welfare impact on the economy.

Titus, Dada Samuel and Ajao (2013) tackled the subject of export promotion but focused on a comparative analysis of the various strategies used in a few countries (including South Africa). Jordaan (2011) provided industry case studies of the impact of generic promotional campaigns, but his study was only

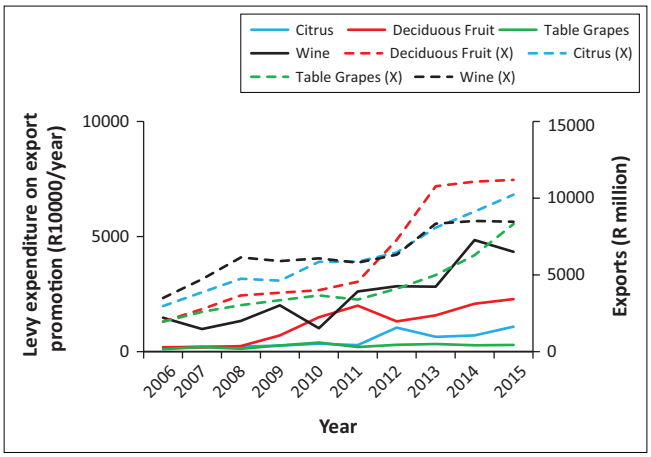
exploratory. Thus, this article differs from what the mentioned studies offer in a number of aspects, as shall be seen in the subsequent sections. Although the NAMC (2013, 2015) argues that stakeholders in the horticulture industries are certain that statutory levy expenditure on EPMD generates satisfactory returns on investment, there is no empirical evidence from any agricultural industry to support this assertion.

Moreover, in the case of the horticulture industries, it is not certain whether the generated returns from the investment translate into higher incomes, and ultimately social welfare improvement. Furthermore, even though industries may have measurement systems through which they may acknowledge returns to investment, it is challenging to provide proof beyond the basic anecdote that EPMD generates satisfactory returns at industrial, national or even social levels. Thus, there is a need to empirically reveal to stakeholders whether statutory levy expenditure on EPMD influences social welfare. In this article, therefore, we aim at (1) quantifying the impact of EPMD statutory levy expenditure on social welfare within the economy and (2) estimating the marginal returns generated per unit of EPMD statutory levy expenditure on social welfare.

This study is relevant given that the insights from this work may be used to support resource mobilisation efforts based on the empirical evidence on the return on investment from the various industries. This is the first study to make this undertaking, particularly in South Africa. The link between statutory levy expenditure on EPMD and social welfare is very important given that the ultimate purpose of EPMD initiatives is to achieve improved living standards of the citizens. Furthermore, it is in the NAMC's interest to show the impact of statutory levies expenditure, and whether there is a justification for it for the society. The NAMC is the institution responsible for liaison between the industry and the Minister of Agriculture, Forestry and Fisheries on issues pertaining to statutory levies. It also has the broad mandate, as specified in the *Marketing of Agricultural Products Act* of 1996, to enhance foreign exchange earnings.

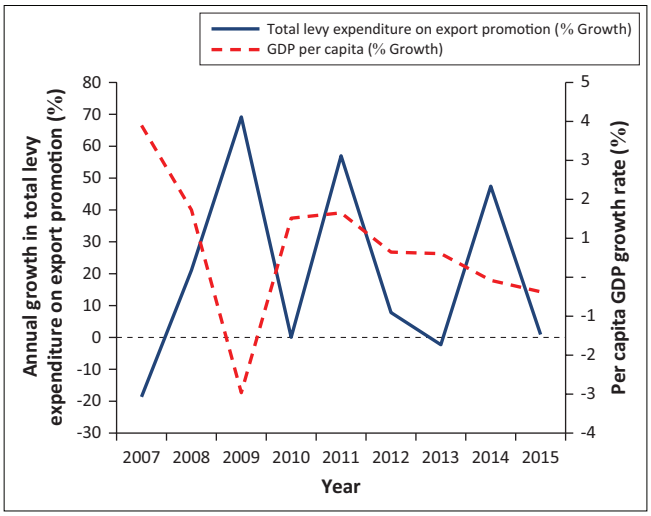
Statutory levy expenditure on export promotion and market development: Exports by industry and selected economic indicators

Since the introduction of levies during the mid-2000s, each industry through an administrative body collects the statutory levies that are used in accordance with stakeholders' consensus. For the purpose of this article, we focus on the citrus, deciduous fruits, wine and table grapes industries, which introduced statutory levy collection in August 2004, October 2007 and November 2006, respectively (NAMC 2008). The NAMC compiles and disseminates the status of statutory levy incomes and expenditures through the annual statutory measures status report. Over a 10-year period (2006–2015), exports have increased as statutory levy expenditure on EPMD has also been increased (see Figure 1); however, this observation does not provide the needed empirical evidence. For the four industries (on average),



Source: DAFF 2016, Statutory measures publications of NAMC and TradeMap database, Industry associations[1]

FIGURE 1: Exports and statutory levy expenditure on export promotion and market development by industries. (X) denotes exports.



Source: DAFF 2016, Statutory measures publications of NAMC and Development Indicators database of the World Bank 2016

FIGURE 2: Annual growth rate of per capita gross domestic product (GDP) and total statutory levy expenditure on export promotion and market development of the four industries.

about R43.8 million of the statutory levy income was used for EPMD while R20.8 billion worth of goods were exported (NAMC publications, TradeMap database). Although citrus exports destined for countries within the European Union faced a ban between 2013 and 2015, it is clear from Figure 1 that the ban seems not to have had a significant influence on South Africa's export trend at a global perspective.

On average, the wine industry spent the most on EPMD (R24.3m), followed by deciduous fruits (R12m), citrus (R5m) and table grapes (R2.5m). Similarly, the wine industry registered most exports, valued at R6.4bn, followed by citrus (R6.2bn), table grapes (R4.2bn) and deciduous fruits (R4.1bn).

With regard to social welfare as measured by per capita gross domestic product (GDP), Figure 2 reveals that annual

1.HORTGRO services, Citrus Growers' Association (CGA), SA Table Grape industry, and Wines of South Africa (WOSA).

TABLE 1: Summary statistics per quarter of a calendar year.

Description	Pooled mean (n = 160)	Citrus (n = 40)	Deciduous fruits (n = 40)	Table grapes (n = 40)	Wine (n = 40)
Statutory levy expenditure on EPMD (R million)	2.74 (2.85)	1.25 (0.83)	3.01 (1.97)	0.62 (0.22)	6.07 (3.22)
GDP per capita (constant 2010 US$)	1863.15 (39.12)	1863.15 (39.12)	1863.15 (39.12)	1863.15 (39.12)	1863.15 (39.12)

Note: Standard deviations are in parenthesis.
EPMD, export promotion and market development; GDP, gross domestic product.

growth in per capita GDP ranged between −3% (2009) and 4% (2007). As discussed in detail by Van den Bergh and Antal (2014), we take cognisance of the critics of using per capita GDP as a social welfare measure; however, in the absence of a unanimously agreed upon credible alternative, per capita GDP was used as a proxy. The alternative indicators of social welfare, including the Index of Sustainable Economic Welfare (ISEW) (Daly & Cobb 1989) and the Sustainable Benefit Index (SBI) (Lawn & Sanders 1999), are also based on GDP corrections and are currently only available for developed economies (Kubiszewski et al. 2013). Another set of social welfare indicators also derived from GDP with a focus on environmental externalities and natural resource depletion is the sustainable GDP. Hueting's Sustainable National Income (SNI) being the most known was only developed for the Netherlands (Gerlagh et al. 2002). Other categories of indicators include the Genuine Savings (GS) and composite indexes such as the Human Development Index (HDI). Pillarisetti (2005) reckons that the GS is an imperfect social welfare indicator while Dasgupta (2001) argues that the HDI is limited to covering all the relevant types of capital; hence, it does not provide useful information to address concerns over time. On the other hand, annual growth rate in total statutory levy expenditure on EPMD across the citrus, deciduous fruits, table grapes and wine industries highly fluctuated over the 10-year period. The highest growth rate of 69.2% was registered between 2008 and 2009, while the lowest (−18.7%) was between 2006 and 2007, with an overall mean annual rate of 20.3%. At industry level, all industries had positive annual growth rates in statutory levy expenditure on EPMD, that is, deciduous fruits (43.9%), citrus (38.9%), wine (25.5%) and table grapes (24.6%).

Despite the growing body of literature about the role of EPAs in enhancing exports (Gil, Llorca & Serrano 2008; Hayakawa et al. 2014; Lederman, Olarreaga & Payton 2009; Lederman et al. 2010; Martincus & Carballo 2008; Olarreaga et al. 2016) and literature based on firm-level analysis (Jalali 2012; Schminke & Van Biesebroeck 2013; Martincus & Carballo 2008;), no literature directly relating to social welfare (per capita GDP) and EPMD has been come across. Existing literature used various indicators to capture the role of EPAs while employing either firm-level data (Lederman, Olarreaga & Zavala 2016; Martincus & Carballo 2010; Schminke & Van Biesebroeck 2013; Van Biesebroeck, Konings & Martincus 2016; Martincus & Carballo 2008) or aggregated data (Hayakawa et al. 2014; Rose 2007). With the exception of Keesing and Singer (1990, 1992), who criticise the performance of EPAs in developing economies, later studies generally suggest that EPAs boost exports and that money spent on promotional activities generates some returns. However, there is very scanty literature focusing on South Africa, especially at industry level while addressing the aspect of social welfare.

Research method and design

Data

The study focused on four industries, namely citrus, wine, table grapes and deciduous fruits. A data set of statutory levy expenditure on EPMD was generated from statutory measures survey reports compiled by the NAMC. Data on per capita GDP (constant 2010 US$) were obtained from the World Bank's Development Indicators (WBDI) database for a 10-year period (2006–2015). As discussed earlier, despite the fact that it is not supported by macroeconomic theory (Van den Bergh & Antal 2014),[2] per capita GDP was used as a proxy for social welfare. Although statutory levy expenditure on EPMD was aggregated at annual level, equal distribution among the quarters throughout the year was assumed, hence divided by four to obtain data sets at quarterly level. This gave rise to 160 pooled observations and 40 observations for each industry. A summary of the descriptive statistics is presented in Table 1.

On average, the four industries (citrus, deciduous fruits, table grapes and wine) used R10.9m worth of statutory levy expenditure for EPMD per quarter (about R43.8m a year), while exports worth R5198m were collectively exported per quarter. The mean value for per capita GDP is representative of the entire economy per quarter. Unlike firm-level data, aggregated data are advantageous given that they provide a clear illustration of how EPMD impacts economic growth at various levels. Furthermore, the International Trade Centre (ITC 2016) urges that firm-level data are severely affected by the problem of selection bias; thus, we directly use aggregated data to circumnavigate the mentioned drawbacks associated with firm-level data.

Unit root test

When using time series data, it is important to ascertain if the statistical properties of the series such as mean, variance, autocorrelation, etc., are constant over time. The Levin–Lin–Chu (LLC) (2002) test with trend option was used to test for

2.See Van den Bergh and Antal (2014) for the detailed reasons and a list of respected economists who discredit the use of GDP-based measures as indicators of social welfare.

TABLE 2: Adjusted *t* statistics for the Levin–Lin–Chu test.

Variable	Adjusted *t* statistic	*p*-value	Remark
EPMD statutory levy expenditure (LnLevy)	-1.8136**	0.0349	Accept Ho at 5% and 10% levels
Social welfare (LnAgrK)	-1.9795**	0.0239	Accept Ho at 5% and 10% levels

EPMD, export promotion and market development.
**, denote significance at 5% level.

unit roots given that the panels were balanced, the number of periods outweighed the number of panels and the panel series increased over time. We tested the hypothesis that the series follow a unit root process. Table 2 indicates that we cannot reject the null hypotheses that the natural logs of statutory levy expenditure on EPMD and social welfare (per capita GDP) exhibit unit roots but at various levels of significance. Thus, conventional estimation techniques were appropriate to use.

Model specification

In this article, we take cognisance of earlier works by Mashabela and Vink (2008), Van Rooney, Esterhuizen and Stroebel (2011), Ndou and Obi (2013) and Boonzaaier (2015), who noted that export competitiveness of the wine, citrus, deciduous fruits and table grape industries is influenced by a number of factors, including inadequately educated workforce, poor infrastructure, lack of trust in the political system, high transportation costs, to mention but a few. In concurrence with Ward and Hogan (2009) and Jordaan (2011), who urge that it is challenging to evaluate the impact of promotional programmes owing to a number of other drivers that influence demand, we limit our independent variables to only two. Additionally, limiting the variables was owing to perfect multicollinearity of the variables mentioned in the earlier studies with statutory levy expenditure on EPMD. Thus, the specified models were restricted to capturing the effects of EPMD and the incidence of export ban that was sanctioned on South Africa's citrus exports to the European Union (EU) because of the citrus black spot (CBS) outbreak in the country. The EU's ban on South Africa's citrus exports into their market was severely felt by South African farmers between November 2013 and 2015 (DAFF 2013; EU 2013).

An econometric evaluation of the impact of – and returns to – EPMD expenditure on social welfare was done using a panel data framework at two levels, that is, at industry level and when the four industries are aggregated (pooled). The panel data set is advantageous given that it controls the unobserved heterogeneity over time (ITC 2016; Olarreaga et al. 2016). This is referred to as the reverse causality problem. To overcome the reverse causality problem associated with statutory levy expenditure on EPMD and social welfare, lagged variable of statutory levy expenditure on EPMD was used in the model. To capture the effect of EPMD using statutory levies on social welfare, a linear model was used based on pooled data (Equation 1).

$$\ln (Kapito)_{q,t} = \alpha_1 \ln(Levy)_{q,t} + \alpha_2 EUBAN_{q,t} + \varepsilon_{q,t} \qquad \text{[Eqn 1]}$$

A country's economic size has a causal relationship with exports; therefore, inclusion of GDP as a proxy for size may lead to endogeneity bias. Thus, population was introduced in the model used given that it has no direct relationship with exports but because of serial correlation, it was also dropped. Equation 2 represents industry specific models.

$$\ln (Kapito)_{i,q,t} = \alpha_1 \ln(Levy)_{i,q,t} + \alpha_2 EUBAN_{i,q,t} + \varepsilon_{i,q,t} \qquad \text{[Eqn 2]}$$

where *Kapito* and *Levy* denote the log of social welfare and statutory levy expenditure on EPMD, respectively. The subscripts *i*, *q* and *t* represent industry, quarter and year, respectively, while ε is the error term. *EUBAN* is a dummy relating to the ban on South Africa's citrus exports to the EU during the CBS outbreak in the country. The dummy variable equals 1 if the industry encountered an export ban in the international markets and 0 otherwise. The dummy addresses the question of whether EPMD had a role to play during such critical times. The α_1 is the coefficient of interest capturing the effects of EPMD using statutory levies on social welfare. It is defined as an elasticity associated with a unit increase in statutory levy expenditure on EPMD.

To avoid solely relying on the simplistic ordinary least squares (OLS) linear regression analysis which is anchored on strong linearity assumptions, we also used Poisson model estimation techniques. The Poisson model assumes that the mean and variance of the errors are equal. Poisson models are advantageous over OLS linear regression models in a sense that they can deal with zero values and discrete distributions, among others. To some extent, ordinary linear regressions identify with Poisson models, except that with the latter, error terms are assumed not to follow a normal distribution, and it models the natural log of the response variable as a function of the coefficients (Gardner, Mulvey & Shaw 1995; Long 1997). Although the lagged natural log of statutory levy expenditure was earlier presented as a control for the unobserved heterogeneity, it was also used to capture the benefits of EPMD initiatives over time given that such benefits accrue after a plausible period (Olarreaga et al. 2016). Hence, models with the lagged variable are described as the dynamic models and were estimated for each of the equations (1 and 2).

To estimate the marginal returns generated per rand of statutory levy expenditure on social welfare, we obtained the derivative of each equation with respect to the log of statutory levy expenditure on EPMD and the corresponding elasticities were computed at the mean values. For the dynamic models, the marginal returns were calculated as the sum of the products of the coefficients of log statutory levy expenditure on EPMD elasticities and the mean values. This was done both at pooled and specific industry levels.

Results

Pooled results from the estimation of Equation 1 are provided in Table 3 for the four industries using OLS and Poisson analysis. For all the specifications, statutory levy expenditure

on EPMD has a statistically significant positive effect on social welfare. For social welfare, a 1% increase in EPMD statutory levy expenditure translates into an improvement in social welfare ranging between 0.1% and 0.8%. It is also important to note that EU's ban of South Africa's citrus led to an increase in social welfare. This may be attributed to the fact that citrus was only banned in the EU, yet South Africa explores many other markets. Secondly, the ban may have had a stimulus to export more of the other commodities that were not necessarily affected.

TABLE 3: Average impact of export promotion and market development levies on social welfare for the four industries (static models).

Social welfare (LnKapito)	OLS (n = 160)	Poisson (n = 160)
EPMD (LnLevy)	0.008*** (0.001)	0.001*** (0.0002)
Citrus ban (EUBAN)	0.019*** (0.002)	0.003*** (0.0003)
Intercept	7.421*** (0.021)	2.00*** (0.003)
R^2	0.198	-
Wald chi²	-	110.61
Pseudo R^2	-	0.000
Fit of the model (Goodness-of-fit chi²)	-	0.008

Note: EUBAN is a dummy relating to the ban on South Africa's citrus exports to the EU during the CBS outbreak in the country.

EPMD, export promotion and market development; OLS, ordinary least squares.

***, denote significance at 1% level.

TABLE 4: Average impact of export promotion and market development levies on social welfare for the four industries (dynamic model).

Social welfare (LnKapito)	OLS (n = 160)	Poisson (n = 160)
EPMD (LnLevy)	0.002 (0.005)	0.0002 (0.001)
EPMD previous period (Lg LnLevy)	0.005 (0.005)	0.001 (0.001)
Citrus ban (EUBAN)	0.018*** (0.002)	0.002*** (0.0002)
Intercept	7.429*** (0.020)	2.01*** (0.003)
R^2	0.192	-
Wald chi²	-	107.97
Pseudo R^2	-	0.000
Fit of the model (goodness-of-fit chi²)	-	0.007

Note: EUBAN is a dummy relating to the ban on South Africa's citrus exports to the EU during the CBS outbreak in the country.

EPMD, export promotion and market development; OLS, ordinary least squares.

***, denote significance at 10% level.

Results of dynamic models presented in Table 4 were insignificant because of the overall pooling effect of the four industries. Results of only Poisson model are presented in the subsequent tables at industry level.

Results in Table 5 suggest that statutory levy expenditure on EPMD leads to a 0.2% to 0.4% improvement in social welfare. In absolute terms, this seems a small contribution, but it is not necessarily the case given the fact that focus is on a few industries, within the agricultural sector. Table grapes industry was the biggest contributor towards social welfare, implying that a unit increase in statutory levy expenditure on EPMD leads to 0.4% improvement in social welfare. Among other factors, the slight variations in the coefficients on EPMD across industries may be because of industry specific characteristics. The positive and statistically significant coefficient (0.001, $p < 0.05$) on the ban of citrus exports to the EU suggests there was improved social welfare as a result of the ban. This may be explained by the fact that a ban on a specific commodity into a specific market like the EU could have boosted trade with other markets, thereby increasing the income base of the producers, traders and other actors along the value chains.

With regard to the returns to investment, pooled results provided in Table 6 reveal that 1 rand of statutory levy expenditure on EPMD generates social welfare improvement

TABLE 5: Average impact of export promotion and market development levies on social welfare (US$), by industry (2006–2015).

Variables	Citrus		Deciduous fruits		Table grapes		Wine	
	Static	Dynamic	Static	Dynamic	Static	Dynamic	Static	Dynamic
EPMD (LnLevy)	0.003*** (0.000)	0.002*** (0.001)	0.002*** (0.000)	-0.0001 (0.001)	0.004*** (0.001)	0.0002 (0.001)	0.003*** (0.000)	0.002** (0.001)
Previous EPMD (LgLnLevy)	-	0.001* (0.001)	-	0.002** (0.001)	-	0.003*** (0.0017)	-	0.001 (0.001)
Citrus ban (EUBAN)	0.001*** (0.000)	0.001** (0.000)	-	-	-	-	-	-
Intercept	1.979*** (0.007)	1.980*** (0.007)	1.991*** (0.006)	1.993*** (0.006)	1.970*** (0.016)	1.972*** (0.016)	1.969*** (0.000)	1.971*** (0.007)
Wald chi²	50.63	50.98	23.46	26.68	9.58	14.47	48.62	53.88
Pseudo R^2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Log pseudolikelihood	-77.578	-75.641	-77.578	-75.641	-77.578	-75.641	-77.578	-75.641
N	**40**	**39**	**40**	**39**	**40**	**39**	**40**	**39**

Note: Results based on the static model imply that parameter estimates are fixed for all the period considered in the analysis, while results based on the dynamic model mean that parameter estimates can change over time. EUBAN is a dummy relating to the ban on South Africa's citrus exports to the EU during the CBS outbreak in the country.

*, ** and *** denote significance at 10%, 5% and 1% levels, respectively.

EPMD, export promotion and market development.

TABLE 6: Returns to social welfare per R1 of statutory levy expenditure on export promotion and market development.

Variable	Pooled		Citrus		Deciduous fruits		Table grapes		Wine	
	Static	Dynamic	Static	Dynamic	Static	Dynamic	Static	Dynamic	Static	Dynamic
Social welfare†	26	-	75	509	52	50	89.43	82	93	73

Note: Results based on the static model imply that parameter estimates are fixed for all the period considered in the analysis, while results based on the dynamic model mean that parameter estimates can change over time.

†, Measured as GDP per capita at constant 2010 US$ while blanks imply insignificant marginal elasticities, hence left out.

of US$26 (at constant 2010 prices). This means that people's standard of living, as measured by GDP per capita, improved by US$26 for each rand spent on EPMD. In reality, levy expenditure on EPMD fluctuates across the years considered in this article; thus, the discussion of results focuses on the results of the dynamic model. The high returns to agricultural net income in the dynamic model are attributed to the fact that actual realisation of returns occurs after some period (2–3 years, depending on the industry and the specific commodities) following promotional activities.

Estimates suggest that the citrus industry generates the highest returns on social welfare per rand spent on EPMD, followed by the table grapes industry, wine industry and the deciduous fruits industry, respectively. The variations in the returns across industries on the various components of the economy are attributable to the various industry characteristics as well as the EPMD activities undertaken by the different industries.

Conclusion and recommendations

Statutory levy expenditure on EPMD plays a critical role in improving the social welfare of South Africans. In terms of returns generated from statutory levy expenditure on EPMD, the citrus industry delivers the highest returns to social welfare per rand spent, followed by the wine and table grapes industries. Conclusively, the impact on and returns to social welfare of EPMD based on statutory levy expenditure varies across industries because of the differing industry characteristics. Policy wise, it is important to mobilise more resources to facilitate the EPMD initiative for citrus, deciduous fruits, table grapes and wine industries. For future research, there is a need to evaluate the other industries (i.e. cotton, fynbos and potatoes) which also use levies for EPMD activities.

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Competing interests

We declare that we have no financial or personal relationships that may have inappropriately influenced us in writing this article.

Authors' contributions

M.H.L. was the project leader and made conceptual contributions and data analysis. B.N., N.M. and Y.X.P. were responsible for data collection, while S.N. made contributions towards the concept and discussion of results.

References

Boonzaaier, J.D.T.L., 2015, 'An inquiry into the competitiveness of the South African stone fruit industry', PHD thesis, Department of Agricultural Economics, Stellenbosch University.

Daly, H.E. & Cobb, J., 1989, *For the common good: Redirecting the economy toward community, the environment, and a sustainable future*, Beacon Press, Boston, MA.

Dasgupta, P., 2001, *Human well-being and the natural environment,* Oxford University Press, Oxford.

Department of Agriculture Forestry and Fisheries, 2013, *The ban on the importation of South African Citrus*, viewed 26 October 2016, from http://www.daff.gov.za/daffweb3/Home/aid/85

Department of Agriculture Forestry and Fisheries, 2016, *Agricultural abstract*, viewed 23 October 2016, from http://www.daff.gov.za/Daffweb3/Portals/0/Statistics%20and%20Economic%20Analysis/Statistical%20Information/Abstract%202016%20.pdf

European Union, 2013, *Press release, SA-EU citrus trade stays in the limelight*, viewed 27 October 2016, from http://eeas.europa.eu/archives/delegations/south_africa/documents/press_corner/20130827_cbs_final_en.pdf

Gardner, W., Mulvey, E.P. & Shaw, E.C., 1995, 'Regression analyses of counts and rates: Poisson, overdispersed Poisson, and negative binomial models', *Psychological Bulletin* 118, 392–404. https://doi.org/10.1037/0033-2909.118.3.392

Gerlagh, R., Dellink, R.B., Hofkes, M.W. & Verbruggen, H., 2002, 'A measure of sustainable national income for the Netherlands', *Ecological Economics* 41, 157–174. https://doi.org/10.1016/S0921-8009(02)00021-6

Gil, S., Llorca, R. & Serrano, J.A.M., 2008, 'Measuring the impact of regional export promotion: The Spanish case', *Papers in Regional Science* 87(1), 139–146. https://doi.org/10.1111/j.1435-5957.2007.00155.x

Hayakawa, K., Lee, H.H. & Park, D., 2014, 'Do export promotion agencies increase exports?', *The Developing Economies* 52(3), 241–261. https://doi.org/10.1111/deve.12048

International Trade Centre (ITC), 2016, *Investing in trade promotion generates revenue – A study of trade promotion organizations*, International Trade Centre, Geneva, Switzerland.

Jordaan, D., 2011, 'A review of generic promotional programs for agricultural commodities and products', unpublished report, NAMC, Pretoria, South Africa.

Keesing, D.B. & Singer, A., 1990, *Development assistance gone wrong: Why support services have failed to expand exports*, vol. 543, World Bank, Washington DC, United States.

Keesing, D.B. & Singer, A., 1992, 'Why official export promotion fails', *Finance and Development* 29(1), 52.

Kubiszewski, I., Costanza, R., Franco, C., Lawn, P., Talberth, J., Jackson, T. et al., 2013, 'Beyond GDP: Measuring and achieving global genuine progress', *Ecological Economics* 93, 57–68. https://doi.org/10.1016/j.ecolecon.2013.04.019

Lawn, P. & Sanders, R., 1999, 'Has Australia surpassed its optimal macroeconomic scale: Finding out with the aid of "benefit" and "cost" accounts and a sustainable net benefit index', *Ecological Economics* 28, 213 –229. https://doi.org/10.1016/S0921-8009(98)00049-4

Lederman, D., Olarreaga, M. & Payton, L., 2009, *Export promotion agencies revisited*, World Bank Policy Research Working Paper Series, no. WPS 5125, viewed 14 November 2016, from https://openknowledge.worldbank.org/handle/10986/4315.

Lederman, D., Olarreaga, M. & Payton, L., 2010, 'Export promotion agencies: Do they work?', *Journal of Development Economics* 91(2), 257–265. https://doi.org/10.1016/j.jdeveco.2009.09.003

Lederman, D., Olarreaga, M. & Zavala, L., 2016, 'Export promotion and firm entry into and survival in export markets', *Canadian Journal of Development Studies* 37, 1–17. https://doi.org/10.1080/02255189.2016.1131671

Long, J.S., 1997, *Regression models for categorical and limited dependent variables*, Chapter 8, Sage, Thousand Oaks, CA.

Martincus, C.V. & Carballo, J., 2008, 'Is export promotion effective in developing countries? Firm-level evidence on the intensive and the extensive margins of exports', *Journal of International Economics* 76(1), 89–106. https://doi.org/10.1016/j.jinteco.2008.05.002

Martincus, C.V. & Carballo, J., 2010, 'Beyond the average effects: The distributional impacts of export promotion programs in developing countries', *Journal of Development Economics* 92(2), 201–214. https://doi.org/10.1016/j.jdeveco.2009.02.007

Mashabela, T.E. & Vink, N., 2008, 'Competitive performance of global deciduous fruit supply chains: South Africa versus Chile', *Agrekon* 47(2), 240–257. https://doi.org/10.1080/03031853.2008.9523799

Mather, C., 2003, *Regulating South Africa's citrus export commodity chain(s) after liberalisation*, School of Geography, Archaeology and Environmental studies, University of Witwatersrand, Johannesburg, South Africa.

National Agricultural Marketing Council (NAMC), 2008, *Status of statutory levies collected in terms of the Marketing of Agricultural Products Act No 47 of 1996*, 2007 survey, A report by the National Agricultural Marketing Council to the Minister of Agriculture and Land Affairs, NAMC, Pretoria, South Africa.

National Agricultural Marketing Council (NAMC), 2013, *Status report on statutory measures*, 2013 survey, NAMC, Pretoria, South Africa.

National Agricultural Marketing Council (NAMC), 2015, *Short report on statutory measures implemented in terms of the Marketing of Agricultural Products Act, Act No. 47 of 1996*, A short report by the National Agricultural Marketing Council to the Minister of Agriculture, Forestry and Fisheries, NAMC, Pretoria, South Africa.

Ndou, P. & Obi, A., 2013, 'An analysis of the competitiveness of the South African citrus industry using the constant market share and Porters' diamond model approaches', *International Journal of Agricultural Management* 2(3), 160–169. https://doi.org/10.5836/ijam/2013-03-05

Olarreaga, M., Sperlich, S. & Trachsel, V., 2016, *Export promotion: What works?*, No. 11270, CEPR Discussion Papers. Center for Economic and Policy Research, Washington DC, United States

Pillarisetti, J.R., 2005, 'The World Bank's 'genuine savings' measure and sustainability', *Ecological Economics* 55, 599–609. https://doi.org/10.1016/j.ecolecon.2005.01.018

Rose, A.K., 2007, 'The foreign service and foreign trade: Embassies as export promotion', *The World Economy* 30(1), 22–38. https://doi.org/10.1111/j.1467-9701.2007.00870.x

Schminke, A. & Van Biesebroeck, J., 2013, *Evaluation of export promotion policies in Belgium*, University of Leuven, Leuven, Belgium.

Titus, O.A., Dada Samuel, O. & Ajao, O.S., 2013, 'A comparative analysis of export promotion strategies in selected African countries (South Africa, Nigeria and Egypt)', *International Journal of Management Sciences* 1(6), 204–211.

Van Biesebroeck, J., Konings, J. & Martincus, M.C., 2016, *Did export promotion help firms weather the crisis?*, VIVES Discussion Paper, No. 51, viewed 28 November 2016, https://ssrn.com/abstract=2724530 or http://doi.org/10.2139/ssrn.2724530

Van den Bergh, J. & Antal, M., 2014, *Evaluating alternatives to GDP as measures of social welfare/progress*, Working Paper 56, Universitat Autònoma de Barcelona, Barcelona, Spain.

Van Rooyen, J., Esterhuizen, D. & Stroebel, L., 2011, 'Analyzing the competitive performance of the South African wine industry', *International Food and Agribusiness Management Review* 14(4), 179–200.

Ward, C.E. & Hogan, R.J., 2009, 'Beef and Pork checkoffs: Challenges, impacts, alternatives', Oklahoma Cooperative Extension Fact Sheets AGEC-588, Oklahoma Cooperative Extension Service, Oklahoma State University, Oklahoma.

World Bank, 2016, *World Development indicators database*, viewed 27 November 2016, from https://datacatalog.worldbank.org/dataset/world-development-indicators