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Full Length Research Paper

Estimating the cost of common monetary area in SADC countires: A case study from the Namibian Beef Industry, a vector error correction model approach

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The aim of this study was to measure the cost of the common monetary area (CMA) to the beef industry in Namibia as a result of the South African Reserve Bank's monetary policy. A vector error correction (VEC) model was applied to measure the dynamic effect of the interest and exchange rate between the rand/Namibian dollar on the Namibian beef industry, and more specifically to examine how the volatile nature of the rand/Namibian dollar interest and exchange rates has caused consumers to absorb short-run price changes. The study found that Namibian consumers have to absorb more than the South African short-run price overshot, causing the beef industry to lose even more of its competitive advantage. For example, the results show that a 1% change in South Africa's money supply or in the appreciation (depreciation) of the rand/Namibian dollar leads to a 2% rise in beef prices in Namibia, making the cost of living more expensive in Namibia than in South Africa. Due to the linkages between monetary policy variables and relative agricultural prices, it is recommended that agricultural policymakers and monetary authorities in the CMA work closely together in designing and implementing monetary policy for the planned Southern African Development Community (SADC) in view of facilitating a common currency. This is important, because monetary policies that are meant to stabilise the entire region and positively influence the SADC economy may have a less-desirable impact on the agro-food industry, as well as on farmers and consumers, especially in the short run.

Key words: Common monetary area (CMA), interest and exchange rates, Namibian beef industry, vector error correction (VEC) model.

INTRODUCTION

Monetary union is an increasingly topical issue in economic policy discussions and has been widely perceived as being both successful and beneficial for member countries. On the African continent, there have been several recent monetary integration initiatives, and achieving a continent-wide monetary union by 2021 has been adopted by the African Union (AU) as a formal objective (Ashipala and Haimbodi, 2003).

As noted in Teweldemedhin (2009), the outlined plan for the African Monetary Union (AMU) envisages regional monetary unions providing the building blocks of an eventual continent-wide monetary union. One of these blocks comprises the 14 countries that make up the Southern African Development Community (SADC), which is one of the longest-standing monetary integration arrangements in Africa. The 14 SADC members have a variety of monetary arrangements, which can be classified into three groups in terms of the exchange-rate arrangements in place:

1. Floating exchange rate (with varying degrees of official intervention): Angola; Democratic Republic of Congo; Madagascar, Malawi; Mauritius; Mozambique; Republic of South Africa; Tanzania; Zambia.
2. Pegged exchange rate: Lesotho; Namibia; Swaziland (pegged to the South African rand); Botswana (pegged to a basket comprising the South African rand and Special Drawing Right (SDR) of the International Monetary Fund (IMF) – a basket currency comprising the US dollar, the euro, yen and British pound).
3. Non-convertible currency (with official and parallel exchange rates): Zimbabwe.

The main feature of monetary integration within the SADC is the Common Monetary Area (CMA) – formerly the Rand Monetary Area (RMA) – which currently counts the Republic of South Africa, Namibia, Lesotho and Swaziland as members. As noted above, the rand floats freely against international currencies, while the currencies of Namibia, Lesotho and Swaziland are pegged one-for-one with the rand (Teweldemedhin, 2009).

This monetary union was a counterpart to the Southern African Customs Union (SACU), dating back to 1910 and involving the same four countries (Martine and Trudi, 2004). From 1921 onwards, when South Africa introduced its own currency and established the South African Reserve Bank (SARB), the South African rand was circulated freely in Botswana, Lesotho and Swaziland (known as the BLS countries). However, South Africa gave no consideration to the seigniorage income earned from the circulation of the rand outside national boundaries. Monetary and exchange-rate policies were determined solely by South Africa in its own national interests. The BLS countries had no independent foreign exchange reserves, and the accumulated balance of payment surpluses had to be held in the form of rand balances. There were no exchange controls within the RMA, and the BLS countries applied South African exchange controls to transactions with countries outside the union (Jefferis, 2007).

In light of the BLS countries' increasing sense of dissatisfaction with the RMA arrangements, and following the successful renegotiation of the SACU agreement in 1969, negotiations began in the early 1970s to formalise the monetary arrangement and to secure an improvement in its terms for the BLS countries. While the negotiations were in progress, however, Botswana decided that it would not be party to the new agreement and would instead establish its own central bank and introduce its own currency, the pula. Nevertheless, a new monetary agreement formalising the RMA was reached in 1974 and did offer significant improvements. These included an agreement that Lesotho and Swaziland would establish central banks and introduce their own currencies, on condition that those currencies maintained a one-for-one parity with the rand. The rand would remain legal tender in Lesotho and Swaziland, and South Africa would pay seigniorage in proportion to the amount of rand circulating in those countries, but their currencies would not be legal tender in South Africa. The agreement was amended in 1986, when the RMA became the CMA, and again in 1992 in order to introduce more flexibility and to accommodate the independence of Namibia, which joined the CMA in that year, although it had been a *de facto* member while under South African control prior to independence. Other changes that were introduced included giving Lesotho, Namibia and Swaziland (the LNS countries) some independent control over their foreign exchange reserves, allowing them to hold non-rand assets and to vary their exchange controls (although only in the direction of being stricter than South Africa). Swaziland also secured some specific concessions, giving it the right (in principle) to change the parity of its currency against the rand, and also terminating the status of the rand as legal tender in Swaziland (and hence ending the right to seigniorage payments from South Africa). At present, however, the rand continues to circulate freely in the country (Jefferis, 2007).

The Bank of Namibia's monetary policy is thus undertaken with a view to keeping prices (consumer and interest rates) in line with South African rates. This strategy is driven by the desire to achieve and maintain stable and low levels of prices (inflation). Added to this is the fact that over 80% of Namibia's imports are sourced from South Africa. As long as South Africa remains a low-inflation country, the pegged exchange rate should continue to be an appropriate intermediate target for ensuring price stability. It constrains monetary expansion, restrains excessive government spending, and sends out credible signals to economic agents about the prospects of inflation (BoN, 2010).

However, within the above context, Kalenga (2001) raised some basic and critical questions, which still remained unanswered: How does this arrangement ensure monetary stability? Does the stability of the exchange rate (stability of the external value of the currency) necessarily coincide with the stability of the internal value of the currency (price stability)?

Within the current reality of the South African agricultural sector's contribution to the economy showing an ongoing declining trend, the continuous raising of interest rates by SARB and the impact of the bilateral agreement between South Africa and the European Union (EU) are signals that Namibia must be cautious and revise its trade relationships with South Africa and the CMA.

Objective

The aim of this study was to measure the cost of the CMA to the beef industry in Namibia, specifically the effect on the CMA of monetary changes made by SARB, and to test the extent of linkages between money supply (interest rates), exchange rates and agricultural prices, taking the Namibian beef industry as a case study. More importantly, it evaluated the impact of macro variables (mainly South African monetary policy changes and the variability of the rand/Namibian dollar) on beef prices and exports.

Background to the Namibian beef industry

Although agriculture contributes only about 6% to the

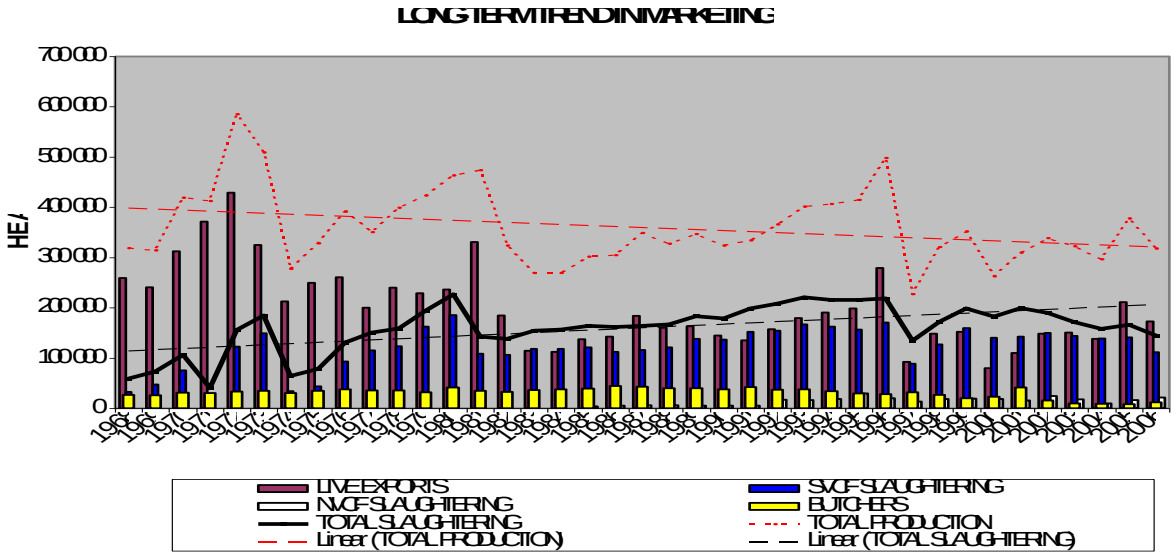

Figure 1. Long-term marketing trend. Source: Meat Board of Namibia (2007).

GDP, it is regarded as an important part of Namibia's economy, as it employs 37% of the work force, and sustains 70% of the Namibian population (Mushendami et al., 2008). Cattle-farming is the main agricultural production sector in Namibia, with an estimated production value of N$ 900 million annually, of which approximately N$ 400 million is contributed by weaner exports. A total of 45 000 tonnes of beef are produced annually, with about 70% of this production exported to South Africa. Under the Cotonou agreement, Namibia is allowed to annually export to Europe 13 000 tonnes of high-quality hindquarter cuts, vacuum-packed and chilled, whereas forequarter cuts are frozen (Meat Board of Namibia, 2007).

The average number of cattle being farmed in the country was estimated at 2.4 million in 2007; furthermore, livestock farming contributes about 75% to the total agricultural economy, of which 69% is estimated to be from commercial livestock production, other than communal farming (Meat Board of Namibia, 2007). The farming sector is divided by a Veterinary Cordon Fence (VCF) into two sections, known as North of the Veterinary Cordon Fence (NVCF) and South of the Veterinary Cordon Fence (SVCF). Due to the common occurrence of foot-and-mouth disease in the northern part of the country, it is illegal to transport animals or animal products from the north to the south of the fence. The commercial farming sector is well developed, capital intensive and export oriented, accounting for 69% of the national agricultural output from 52% of the available farming/grazing land. In the SVCF region, the freehold area is divided into 6 337 farms (1992 data), with an average size of 5 700 ha, owned by about 4 200 individuals or agricultural enterprises. On the other hand, the NVCF region is occupied mainly by communal farmers who occupy about 48% of the total farming area of Namibia and hold approximately 68% of the total cattle population, with grazing areas generally shared by community members. The communal areas also encompass a wide range of environmental conditions and ethnic groups (Meat Board of Namibia, 2007).

There are four meat-export processing plants in Namibia, the largest of which is Meatco (Meat Corporation of Namibia Limited), handling around 80% of all export capacity (Meat Board of Namibia, 2007). Figure 1 indicates that total marketing has been in a state of decline since 1968. Although the rate of slaughtering has increased over this period in general, it has recently been in a state of decline. The average annual marketing of cattle over the period 1968 to 2001 was 363 598 head of cattle, while between 2002 and 2007 this figure dropped to 330 246 head of cattle, which represents a decline of 9%. This can be attributed to factors such as bush encroachment, the establishment of wildlife conservancies, and increased wildlife farming (Meat Board of Namibia, 2007).

It is important to note that approximately 156 000 head of cattle are exported live to South Africa (six-year average), of which more than 96% are weaners and calves destined for feedlotting. Comparing the first seven months of 2007 with the same period in 2006, there was a 7.84% increase in the export of weaners, from 96 781 in 2006 to 104 369 in 2007. However, this figure is 12.42% lower than the export figure of 117 332 for the same period in 2005 (Meat Board of Namibia, 2007). Figure 2 shows a comparison of weaner auction prices in South Africa and Namibia from January 2001 to July 2007. It is evident that Namibian local weaner prices were lower than the South African prices as from 2001. Between January and March 2006, however, Namibian weaner prices rose to record highs, surpassing South African prices. This might be an indication that Namibian

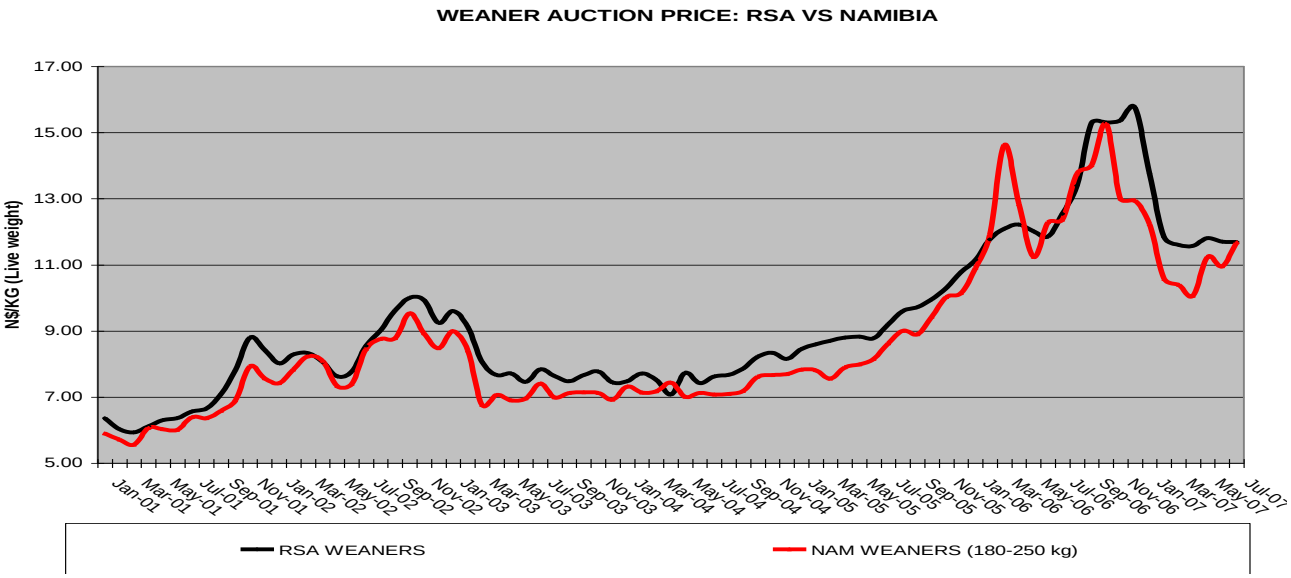

Figure 2. Weaner auction prices in South Africa and Namibia. Source: Meat Board of Namibia (2007).

weaner prices are actually competitive with South African prices. The Meat Board of Namibia (2007) projected that from the ratio between weaner prices and slaughter prices (weaner/slaughter ratio), abattoir prices would be able to compete with weaner exports. The historic weaner/slaughter ratio was calculated at 64%, which is a clear indication that producer prices, for various reasons, were not competitive with weaner prices, resulting in an outflow of live cattle in 2005 and 2006. This situation has since been reversed, as from the first half of 2007.

Challenges in the Namibian beef industry

VCF and diseases

The main challenge being faced by the livestock industry in Namibia is the outbreak of foot-and-mouth disease (FMD) in the Kavango region, near the northern boundary of the Ethosha National Park. The area to the south of this region is an FMD-free area, predominantly consisting of commercial farms. The area to the north of the VCF, that is, NVCF, is predominantly populated by communal cattle farmers. The problem is that of Namibia's estimated 2.4 million head of cattle, only 700 000 are kept to the south of the VCF and are thus eligible for export to the EU and other high-value markets (Meat Board of Namibia, 2007).

Slaughtering and low livestock numbers

The slaughtering of commercial cattle showed a steady decline from 149 109 head in 2002 to 109 468 head in 2007. It is projected that this decline will continue, with local producers fearing that the industry will reach a tipping point and that farmers will lose their domestic market. Meatco and local banks are trying to counter this trend by introducing a weaner financing scheme, allowing farmers to rebuild their herds for local markets. There are more structural reasons for the decline, however, such as increasing bush encroachment and a growing shift towards game farming and ecotourism. The government tends to promote marketing schemes in times of drought, urging farmers to dispose of their animals, but there is a failure to follow up with restructuring schemes in good rainy seasons, thereby creating a downward trend (Meat Board of Namibia, 2007).

Land reform

Another controversial aspect is land reform, which has seen numerous once-profitable farms being reduced to subsistence farms or ceasing operation altogether (Meat Board of Namibia, 2007).

Bush encroachment

The decline in livestock can also be attributed to factors such as bush encroachment, the establishment of wildlife conservancies, and the growing popularity of wildlife farming. Livestock production could be significantly increased by reducing bush encroachment (Meat Board of Namibia, 2007).

Export market problems

The greatest challenge for the beef industry lies in finding

and maintaining secure markets. At present, almost all exports are destined for only three markets, namely South Africa (81%), the United Kingdom (14%) and Norway (2.5%). Since the international beef trade is highly competitive and subject to the vagaries of currency exchange rates and strict quality controls, it is important that Namibia develops additional markets. One aspect to be considered is the extension of the Farm-Assured Namibian (FAN) meat scheme concept. For example, beef could be marketed or branded as having a higher value by virtue of having been produced without feed additives and under free-range conditions in pristine savannas that are virtually free of pollution. The most severe barrier in this regard is the VCF, which spans the breadth of Namibia. While livestock products south of the fence may be freely exported because they come from a zone free of contagious diseases, the products of about one million head of cattle and 1.4 million head of goats north of the fence may only be exported under strict conditions. Due to the risk of spreading FMD and lung diseases to other regions and countries, the exporting of livestock products from north of the VCF is problematic and costly, severely limiting exports from the northern zone. The Director of Veterinary Services is now exploring ways of moving the VCF northwards to include more northern farmers in the “free zone” (Meat Board of Namibia, 2007).

Despite premiums for producers in the north, off-take in the area north of the VCF is around 1.5% compared to 25% south of the VCF. It is mostly older animals that are offered for sale, and Meatco’s two abattoirs in the north have been operating at a loss for as long as anyone cares to remember (Meat Board of Namibia, 2007).

Changing markets and trade agreements

Interim economic partnership agreements have allowed preferential access to the EU market until such time as full agreements can be confirmed, with a reciprocal commitment to open up to European imports. However, the trade-offs between these options remain controversial, with winners and losers across the region, and the future remains uncertain. Namibia enjoys an annual export quota of 13 000 tonnes of prime beef cuts to the EU (Scoones et al., 2010). The other significant development in global beef markets is the intense global competition caused by the growth in South American exports (Scoones et al., 2010).

Changing public and private standards

Traceability is often a key criterion that enables retailers at the top of the supply chain to ensure food safety and guarantee other criteria. Thus in the global red-meat trade, private and public standards mix to give an oft-confusing – and sometimes contradictory – set of signals to producers and their national authorities. Keeping abreast of this fast-moving scene is not easy, since new directives are regularly issued, and interpretations of complex requirements may not be straightforward. For example, a European supermarket chain may demand certain risk assessments and certification standards that may not be the same as those required by European authorities (Scoones et al., 2010), which Southern African exporters will likely find both challenging and frustrating. South American beef-exporting countries have seemingly been better able to negotiate with the World Organisation for Animal Health (OIE) and the EU in respect of the flexibility of sanitary and phytosanitary (SPS) requirements (Scoones et al., 2010).

Theoretical framework of the model

The empirical literature on agricultural economics reflects the investigation into the relationship between monetary variables and agricultural product prices by means of co-integration methods. Studies conducted in the 1980s confirmed the impact of money supply on agricultural prices in developed countries (Bessler, 1984; Devadoss and Meyers, 1987; Orden, 1986; Orden and Fackler, 1989) by using the Granger causality test, forecast error decomposition, and innovation accounting methods. More recent literature reflects the analysis of the association between money and agricultural prices in developed and developing countries by means of the modifying Granger causality test, Toda Yam motto, JJ co-integration, vector error correction (VEC) model, and autoregressive distributed lag (ARDL) approach (Cho et al., 2004; Hye, 2009; Ivanova et al., 2003; Peng et al., 2004; Saghaiaet al., 2002). Using the vector autoregressive (VAR) technique to provide the empirical evidence, Devadoss and Meyers (1987) found that agricultural prices respond more rapidly than manufacturing product prices to a change in money supply in the short run. Saghaian et al. (2002) developed their overshooting hypothesis by including the agricultural prices in the Dornbusch (1976) model. They utilised Johansen’s co-integration and VEC model to examine the overshooting hypothesis in the case of the United States of America (USA). The authors rejected money neutrality and also suggested that agricultural prices adjust more rapidly than industrial prices to monetary shock in the short run. This overshooting hypothesis was widely tested by researchers in later empirical studies. Bakucs and Ferto (2005) used JJ co-integration and the VEC model in the case of a transition economy, finding a long-run relationship between agricultural prices, industrial prices, exchange rate and money supply. By means of the VEC model, they also concluded that agricultural prices adjust more rapidly than industrial prices to monetary shock in the short run. A few years later,

Bakucs and Ferto (2009) examined the hypothesis of Saghaian et al. (2002) in the context of Hungary, using the techniques employed by Saghaian et al. (2002), as well as those they themselves had used previously (Bakucs and Ferto, 2005). Their new study supported the previous finding that agricultural prices adjust more rapidly than industrial prices to monetary shock. Hye (2009) used JJ co-integration and the hypothesis of Saghaian et al. (2002) to examine the relationship between agricultural prices and money supply in the case of Pakistan, finding the long-run elasticity of agricultural prices with respect to money supply to be 0.79. The present study differs from that of Hye (2009) in two ways. Firstly, this study considers agricultural prices, industrial prices, exchange rate and money supply, whereas Hye (2009) considered only money supply and agricultural prices in terms of the empirical investigation. Secondly, the present study can be related to both old and relatively new co-integration techniques like JJ co-integration, the VEC model and the rolling window estimation method.

Threshold co-integration was introduced in 1997 by Balke and Fomby in Hye and Siddiqui (2010) as a feasible means to combine non-linearity and co-integration. In particular, the model allows for non-linear adjustment to long-run equilibrium. Lo and Zivot (2001) provided an extensive review of this growing literature on the potential of a VEC model that can allow multiple co-integrating vectors.

One of the studies that examined the empirical relationship between trade and growth from a time-series perspective using the VEC model was that of Coe and Moghadam (1993), who in their study of France found a robust long-run relationship among growth, factor inputs, and openness, which is intended to capture the effects of total-factor productivity (TFP). Teweldemedhin and Van Schalkwyk (2010) examined the empirical relationship between trade and TFP in the agricultural sector by means of time-series analysis using the VEC model. Results from the time series showed that export shares and capital formation were significant and positively related, whereas import shares and real exchange rate were found to be negatively related.

Therefore, following this background, this study test the relationship of local beef price, montery supply and exechange rate impact the Namibian beef industry, as Namibia currency is attached to South African rand not by negotiation rather it is by choice.

METHODOLOGY AND DATA

The overshooting model of Saghaian et al. (2002) illustrates a long-run relationship among money supply, agricultural and industrial prices, and exchange rates. This study follows the general modelling of Asfaha and Jooste (2007) to test the relationship between agriculture and monetary policy. A VEC model was used, applying monthly time series of the beef price index (price), the South African money supply index (M1t), and exchange rates between the rand/Namibian dollar and US dollar for the period January 2000 to December 2007 (consisting of 96 observations). All data was transformed into logarithms, with the purpose of transformation being to measure elasticity. The monthly data was sourced from the Meat Board of Namibia and the South African Reserve Bank.

MODEL ESTIMATION

Here, the necessary statistical tests and the estimation of the long-term relationship between the variables are shown. There are three subsections: the first two deal with stationary and integration tests respectively, while the third section deals with the model estimation.

Stationarity test (unit root test)

In time series models in econometrics (the application of statistical methods to economics), a unit root is a feature of processes that evolve through time that can cause problems in statistical inference if it is not adequately dealt with. If two variables are trending over time, aregression of one on the other could have a high R^2 even if the two are totally unrelated (Teweldemedhin and Van Schalkwyk, 2010). Previous studies have shown that time-series data, whether monthly, quarterly or annual, is likely to be non-stationary (Bakucs and Ferto, 2005; Cho et al., 2004). In this study, the Augmented Dickey-Fuller (ADF) unit root test, both with and without a linear trend, was performed to test for the stationarity of the variables considered. The ADF test with a linear trend was done to check whether the variables were trend stationary, and the results are presented in Table 1. Since the ADF test is sensitive to the choice of order of the lag, the starting point was the over specification ADF test, where the order of the lag was relatively larger and corresponded to the highest absolute value, that is, the Akaike Information Criterion (AIC). From Table 1, the absolute values of the ADF test level show that it is statistically lower than the 95% critical value. This suggests that the null hypothesis of the unit root is not rejected and that none of these variables are (trend) stationary at levels of 5% significance. Each series was differenced and the ADF test was then performed. The result reveals that the unit root null hypothesis is rejected at a 5% significance level (Table 1).

The results show that not all the series tested were stationary in (log) levels, but rather stationary at a 5% significance level after being differenced once, fulfilling a necessary condition for a co-integration test.

Co-integration test

To test for co-integration, Johansen (1988) and Johansen and Juselius (1990) proposed two statistics to be used to evaluate the rank of the coefficient matrix, or the number

Table 1. ADF test results – with and without trend.

		In levels			Differenced once		
Variables	**Specification**	**Lags**	**Critical value**	**Test statistics**	**Lags**	**Critical value**	**Test statistics**
Price	Constant only	1	−2.8981	−0.73807	1	−2.8986	−5.2861
	Constant with trend	1	−3.4666	−1.6216	1	−3.4673	−5.2733
M1	Constant only	2	−2.8981	1.0003	1	−2.8986	−8.9103
	constant with trend	3	−3.4666	−3.0431	1	−3.4673	−9.0622
EX	Constant only	1	−2.8981	−1.3403	1	−2.8986	−5.4132
	constant with trend	1	−3.4666	−1.9016	1	−3.4673	−5.4199

95% critical value for the Augmented Dickey-Fuller statistic. Source: Model estimation.

Table 2. Trace and maximum Eigen statistics for testing co-integration rank.

Null hypothesis	**Eigenvalue**	**Likelihood ratio**	**5% critical value**	**1% critical value**	**Hypothesised No. of CE(s)**
r=0	0.256534	54.65328	24.31	29.75	None **
r≤1	0.189567	30.93868	12.53	16.31	At most 1 **
r≤2	0.161840	14.12373	3.84	6.51	At most 2 **

*(**) Denotes rejection of the hypothesis at 5 % (1 %) significance level. LR test indicates three co-integrating equation(s) at 5 % significance level.

Table 3. Results for normalised co-integration vectors.

Co-integration vectors	**Vector 1**	**Vector 2**
lnPrice	1.000000	0.000000
lnM	2.795829 (0.89866)	1.000000
lnEx	0.000000	2.164717 (1.03885)

Standard errors in parentheses.

of co-integrating relationships. The one used for purposes of this study was the likelihood ratio test of the null hypothesis, that is, that the number of co-integrating vectors is r versus the alternative r + 1 vector. In this case, the null hypothesis is the number of co-integrating vectors, which equals 0.

Table 2 shows that Likelihood Ratio (LR) statistics are greater than their corresponding coefficients for the critical value in all series ranks; thus co-integration exists between the three-pair rank. The Johansen tests accept the hypothesis at 5% (1%t) significance level LR (Table 2). The results clearly show a long-term co-integrating vector among the variables.

The results from the Johansen tests (Table 2) clearly indicate a long-term co-integrating vector among the variables (the test traced co-integrating equation(s) at the 5% significance level, assuming two lags in the test equation(s). The existence of a long-term relationship among the series leads to the estimate of the VEC model analysis. The next three tables present the long- and short-term dynamic estimations of the model, using elasticity measurements. Table 3 presents the long-run coefficients for the normalised co-integration vectors. The results are consistent with a priori expectations. For the co-integration vectors, the slope coefficients are statistically significant and positive. The interpretation is that a 1% increase in the money supply in South Africa leads to a 2.8% increase in beef prices in Namibia. On the other hand, it also gives rise to a 2.165% increase (depreciation) in the exchange rate, implying that input costs in the beef industry become more expensive and result in the adjustment of beef prices as an

Table 4. Short-run parameter estimates of the VEC model.

Error correction	∆ lnprice	∆ lnM1	∆lnEx
CointEq1	−0.600639***	0.265554*	0.200768*
∆lnPrice(−1)	−0.255252*	−0.146362*	−0.027934
∆lnPrice(−2)	−0.233540*	−0.102791	0.031300
∆lnEx(−1)	−0.265010**	0.142414**	−0.335405**
∆lnEx(−2)	−0.022861	−0.044275	−0.344054**
∆lnM1(−1)	−0.547226**	−0.762860***	0.268766*
∆lnM1(−2)	−0.103118	−0.385670***	0.211336*
R-squared	0.450522	0.662555	0.262217
Adj. R-squared	0.405360	0.634820	0.201577
F-statistic	9.975573	23.88861	4.324179

*** 1% significance level, ** 5% significance level, * 10% significance level.

intervention measure.

For example, in a newspaper report appearing in the Namibian Sun (2011), Kobus du Plessis, the CEO of Meatco, indicated a need for a further increase in volume and improved production efficiency. Even though Meatco had by that time already implemented several cost-saving measures, Du Plessis pointed out that additional interventions would be needed to ensure sustainable future operations, stating that: “Meatco has made a number of changes to its facilities which were necessary from a quality assurance and throughput perspective.” Furthermore, the Namibian Sun (2011) reported that 2010, with its adverse exchange rates, was a very tough year for Meatco, since cattle slaughter numbers remained flat and the strong rand/N$ exchange rate against all trading currencies meant a substantially lower income on export sales. In his year-end message to Meatco producers and employees, Du Plessis said that the impact of the strengthening exchange rate during 2010 alone cost Meatco nearly N$75 million in lost earnings compared to 2009. “As a result, the corporation is under severe financial pressure and although it could have considered dropping producer prices further, it would have had a worse effect on cattle supply and it would have consequently been in an even worse financial situation” (Namibian Sun, 2011).

The money neutrality hypothesis expects the long-run rate of increases in prices to be unit proportional to the rate of increase in money supply – that is, the coefficients for the money supply are expected to be close to one (Asfaha and Jooste, 2007). The findings of this study, however, are that for South African agricultural prices, the estimated coefficients are statistically less than one, which means that the long-run money neutrality hypothesis is rejected and suggests that monetary changes can have a long-run real effect on agricultural prices. Moreover, the results of this study show that the estimated coefficient of beef prices is greater than one (Table 3), which means that an increase in money supply in South Africa is a direct cause of inflation in the Namibian economy. This has a direct effect on the beef industry and consequently on household consumers, which could also imply worsening poverty levels in the country.

Estimating the VEC model

Johansen proposed further tests for simultaneous, separate, short-run dynamics and a long-run equilibrium that do not allow the one to contaminate the other (Fedderke, 2001). Results for the short-run dynamics are presented in Table 4. The coefficients of the co-integration equations in the VEC model, known as the ‘speed of adjustments’, measure how quickly the system returns to its long-run equilibrium after a temporary shock (Asfaha and Jooste, 2007).

The speed of adjustment for beef prices (α11), South African money supply (α22) and the rand/Namibian dollar exchange rate (α33) to the long-run equilibrium is −0.600639, −0.146362 and −0.027934 respectively (Table 4). All coefficients have a negative sign and are statistically significant (expected exchange rate found to be insignificant). This implies that beef prices adjust more rapidly than the other variables, keeping other variables constant with the speed of adjustment at 60 per cent to restore to equilibrium. The speed of adjustment of money supply and the rand/Namibian dollar exchange rate were found to be 14 and 3% respectively. This implies that the Namibian meat industry has been influenced by the supply chains becoming increasingly concentrated and vertically integrated. South African producers, processors and retailers are highly linked in terms of supply chain, which offers security to the producers. As 80% of the supermarkets and private banks in Namibia are owned by South African companies, head office is responsible for making all strategic decisions, such as bulk contract purchases being shipped/transported to head office and distributed to other subsidiaries/branches in Namibia, for example. As a result, livestock, meat and other food

products are exported to South Africa where they are processed before being returned to Namibia. All these supply chains might further reduce market access for the Namibian beef industry. There have, however, been exports to South African retailers through connections between regional abattoirs and supermarkets, but these can be upset by changes in national policies (e.g. restricting the export of small livestock from Namibia). Cross-border regional co-ordination of supply chains within Southern Africa remains weak, with high transaction costs (border controls, customs/excise, export levies/duties, etc.). For example, the average price of beef in a Namibian supermarket is between R/N$ 90 and R/N$ 110, whereas in South Africa it is between R/N$ 60 and R/N$ 70.

The result is that $\alpha 11 > \alpha 22 > \alpha 33$ in absolute value provides evidence of beef price overshooting in the short run. That is, it suggests that beef prices are adjusted to take advantage of the domestic market. The relatively rapid rate of adjustment of agricultural prices, that is, the overshooting of beef prices, can explain the observed price variability.

The remaining parameter estimates are presented in Table 4 for the sake of completeness. The diagnostic tests are similar to those obtained by other studies (Bakucs and Ferto, 2005; Saghaian et al., 2002). The coefficient of determination (R^2) ranges between 0.20 and 0.63, thus the model explains a relatively higher percentage of change in the macro-economic variables than the model estimated by Bakucs and Ferto (2005). In Table 4 Comparing the coefficient determination for money supply and beef price in Namibia, M1 has explain much more higher to Price in the model (Table 4). This implies that SARB should take into account the other CMA economies when making interest rate changes in the South African economy, since such changes in South Africa lead to a greater degree of inflation in the Namibian economy, and those hardest hit are the country's poorest consumers. More specifically, the competitiveness of the agricultural industry is weakened as a result.

Interest rate adjustments by SARB are based on its own inflation and poverty reduction strategies and other macro-economic variables, in order to stabilise its own economy. Thus they do not necessarily consider, serve or represent other CMA members, as these members differ in their poverty and inflation rates. For example, during a recent time of hard economic recession, the South African interest rate was adjusted to 11.5%, whereas the Bank of Namibia kept it at 9.5%. The difference was observed by the government in its subsidisation of basic food items.

IMPLICATIONS OF THE STUDY FOR MANAGERS

Low inflation promotes sustainable, sound economic growth and development. It benefits all, especially the most vulnerable groups in society, that is, the pensioners, the unemployed, and the poor in general. If Namibia allows inflation to gain momentum and become entrenched at a high level, this will be reflected in interest rates, which in turn are firmly ensconced at a high level. If interest rates do not keep pace with inflation, workers are likely to strike and discourage investement opportunity in the country. For example, power shortages and continued interest rate increases are beginning to affect South Africa's economic growth, this will have influence to the CMA as the countries linked to Rand by choice not by negotiation. Interest rates are consequently forced to rise, affecting the CMA as a whole. As the poverty level and economic growth strategy of South Africa differ from that in the rest of the CMA, and since these aspects are guided by SARB without considering the CMA, the cost of living within the CMA becomes very expensive to the rest of CMA, as all with in CMA countires depends on South Africa for its food items. For example, Namibian imports, account for 80% of the country's food items.

According to a recent report on Namibia's unemployment statistics, it is chronic stands on 51.2% of the population is unemployed, despite the government's vision of making the country an industrialised nation.

As a result of this volatility and the unpredictable changes in the interest rate driven by South Africa, it is difficult for the food industry to expand and retain its skilled labour force while still remaining competitive. In most cases, businesses are forced to reduce their labour force, extend working hours or close certain branches in an effort to stay afloat. High food and fuel prices are particularly damaging to the real purchasing power of the lower market segment high interst from RSA complicated the industry problem more, possibly leading to strikes in Namibia as a result of high food prices. Caution must be exercised when interpreting the results of this study, however, as electricity shortages and a downturn in meat industry operations as a result of foot-and-mouth disease outbreaks in Namibia were not considered in the model.

Conclusion

The Bank of Namibia's monetary policy is undertaken with a view to keeping prices (consumer and interest rates) in line with South African rates. This strategy is driven by the desire to achieve and maintain stable and low levels of prices (inflation) (BoN, 2010). The findings of this study, using a VEC model estimation of the Johansen co-integration analysis, reject the long-run money neutrality hypothesis, which means that the rate of increase in money supply in South Africa and the variability of the rand/Namibian dollar have a direct impact on the price of beef. The results of the dynamic relationships present evidence of the Namibian economy being overshot. Thus, when a money supply shock

occurs in South Africa, Namibian consumers must absorb the short-run price variability and overshooting of prices, which in turn impacts on their ability to manage their cash flow, thus presenting a substantial challenge for poor Namibian households. Furthermore, the results indicate that a 1% change in the South African money supply, that is, in the appreciation (depreciation) of the rand/Namibian dollar, leads to a 2% rise in the beef price in Namibia. This implies that the CMA and the bilateral agreement between Namibia and South Africa are univocal, or that trade change is driven by the South African Reserve Bank only.

Therefore, considering the declining trend of agriculture's contribution to South Africa's economy, the trend of a continuous increase of food prices globally, and the radical increase in interest rates by SARB, all of which have a major impact on the Namibian economy and particularly poor households, this implies that Namibia will have to reconsider and revise its bilateral trade agreement with South Africa in the context of finding real bilateral benefits for both parties. The results of this study show that there is a strong linkage between monetary policy variables and beef prices, and it is therefore recommended that Namibian and South African policymakers, as well the monetary authorities of other CMA countries, work closely together in designing and implementing joint monetary policies or facilitating the planned common currency for the SADC. This is important, because monetary policies that are meant to stabilise the entire region and positively influence the SADC economy may have a less desirable impact on the agro-food industry, as well as farmers and consumers, especially in the short run.

Namibia should also seek alternative supply sources instead of being dependent on South Africa to supply all its inputs, as it is risky to rely on only one country of origin. Local markets are important, with increasing demand by an urbanised middle class. Domestic retailing through supermarket chains requires higher quality and improved food safety conditions. This growing market exists in parallel to the still dominant market for beef, which is for low-quality and cheap beef aimed at a growing domestic urban market, and may therefore be an important low-cost option. The policy implications of such a shift have been barely addressed, at both national and regional level, and the opportunities for tapping into growing domestic markets have yet to be fully exploited.

Europe may no longer be the obvious choice of export market. The African, Caribbean and Pacific (ACP) preferential trade agreements and Economic Partnership Agreements (EPAs) lapse at the end of 2012, and any trade protocol will probably be less than favourable. The trade-offs between these options remain controversial, however, with winners and losers across the region, and the future remains uncertain. The other significant development in global beef markets is the intense global competition caused by the growth in South American exports. The volumes being exported far outweigh anything Southern Africa can offer. For example, in 2007, Namibia's world market share in beef was just 0.3% (Mapitse, 2008). Furthermore, the traditional sources of demand in Europe and North America are in decline, although the demand for red meat has grown in the burgeoning economies of the East (as well as the Middle East), most notably in China, where annual consumption of red meat has risen from an average of 20 kg/person in 1985 to 50 kg/person at present. South American countries are competing with Southern Africa for Asian and European markets, but are also exporting to Southern African countries such as Angola and the Democratic Republic of Congo – regions where Namibia ought to have a competitive advantage.

For Middle Eastern and some Asian markets, there are additional requirements for *halal* compliance, meaning additional costs in abattoirs, as well as inspections. In terms of some interpretations of *halal* standards, farm-level production systems must be compliant and not have pigs in any part of the system, for example. With the high cost of entry into EU markets and the decrease in preferential trade options, such markets may be the main high-value export markets of the future. Winners may be few and temporary, however, given the volatility of such markets, and re-gearing industries to such markets may be costly in the long run. As with the multinational retailers, currently there is only limited capacity in Namibia to negotiate trade agreements with diverse markets in Asia and the Middle East.

REFERENCES

Asfaha TA, Jooste A (2007). The effect of monetary changes on relative agricultural prices. Agrekon, 46(4): 460-474.

Ashipala J, Haimbodi N (2003). The impact of public investment on economic growth in Namibia. Namibian Economic Policy Research Unit Working Paper No. 88. Windhoek: NEPRU.

Bakucs LZ, Ferto I (2005). Monetary impacts and overshooting of agricultural prices in a transition economy. Available online at:http://ageconsearch.umn.edu/bitstream/24711/1/cp05ba04.pdf (Accessed: 2011-03-20).

Bakucs LZ, Ferto I (2009). Monetary impacts and overshooting of agricultural prices in a transition economy: The case of Hungary. Available online at: http://ageconsearch.umn.edu/bitstream/51798/2/51798.pdf (Accessed: 2011-03-04).

Bessler DA (1984). Relative prices and money: A vector autoregression on Brazilian data. Am. J. Agric. Econ., 66(1): 25-30.

BoN (Bank of Namibia) (2010). Monetary policy. Available online at: https://www.bon.com.na/Content/TopLevelItems/EconomicInfo/Monetary%20Policy/Default.aspx (Accessed: 2010-06-08).

Cho G, Kim M, Koo WW (2004). The relative impact of national monetary policies and international exchange rate on long-term variations in relative agricultural prices. Available online at: http://www.ag.ndsu.nodak.edu/capts/documents/AGReport528-P.pdf (Accessed: 2011-03-06).

Coe DT, Moghadam R (1993). Capital and trade as engines of growth in France. IMF Staff Papers, 40: 542-566.

Devadoss S, Meyers WH (1987). Relative prices and money: Further results for the United States. Am. J. Agric. Econ., 69(4): 838-842.

Dornbusch R (1976). Expectations and exchange rates dynamics. J. Polit. Econ., 84(6): 1161-1176.

Fedderke JW (2001). Technology, human capital and growth: Evidence from a middle-income country case study applying dynamic heterogeneous panel analysis. Econometric Research Southern Africa Working Paper No. 23. Cape Town: ERSA.

Hye QAM (2009). Money supply and agricultural prices: A causality analysis for Pakistan economy (quarterly data analysis). J. Agric. Res., 47(2): 193-199.

Hye QAM, Siddiqui MM (2010). Money supply, exchange rate, industrial and agricultural product prices: Evidence from Pakistan. Afr. J. Agric. Res., 5(22): 2997-3002.

Ivanova N, Dawson P, Lingard J (2003). Macroeconomic impacts on Bulgarian agriculture during transition. J. Appl. Econ., 35(7): 817-823.

Jefferis KR (2007). The process of monetary integration in the SADC region. J. Southern Afr. Stud., 33: 84-107.

Johansen S (1988). Statistical analysis of cointegrating vectors. J. Econ. Dyn. Control, 12: 231-254.

Johansen S, Juselius K (1990). Maximum likelihood estimation and inference on cointegration – with application to the demand for money. Oxf. Bull. Econ.Stat., 52: 169-210.

Kalenga P (2001). Monetary policy framework in Namibia. Paper presented at the Conference on Monetary Policy Frameworks in Africa. Pretoria, South Africa, 17-19 September 2001.

Lo M , Zivot E (2001). Threshold cointegration and nonlinear adjustment to the law of one price. Macroecon. Dyn., 5: 533-576.

Mapitse N (2008). Botswana's foot-and-mouth disease and beef trade policy: Transboundary animal disease and market access: Future options for the beef industry in Southern Africa. Working Paper No. 3. Brighton: Institute of Development Studies. Available online at: http://www.steps-centre.org/PDFs/VetScience_Working%20Paper%203.pdf (Accessed: 2011-03-28).

Martine V, Trudi H (2004). Trade liberalisation and regional integration in SADC: Policy synergies assessed in an industrial organisation framework. Paper presented at the Macro-Micro Linkage Forum on African Development and Poverty Reduction. Somerset West, South Africa, 13-15 October 2004. Available online at: http://www.commerce.uct.ac.za/Research_Units/DPRU/DPRUConference2004/Papers/Trade_Liberalisation_V sser_ artzenberg.pdf (Accessed: 2011-03-22).

Mushendam P, Biwa, Goamab IIM (2008). Unleashing the Potential of the Agricultural Sector in Namibia. Bank of Namibia Occasional Paper OP 1-2008.

Meat Board of Namibia (2007). Cattle review: Production and marketing trends. Available online at: http://www.nammic.com.na/stats.php (Accessed: 2010-09-10).

Namibian Sun. (2011). Meatco punished by tough exchange rate. Namibian Sun, 4 January 2011. Available online at: http://sun.com.na/story/meatco-punished-tough-exchange-rate (Accessed: 2011-03-28).

Orden D (1986). Agriculture, trade and macroeconomics. J. Policy Model., 8: 27-51.

Orden D, Fackler P (1989). Identifying monetary impacts on agricultural prices in VAR models. Am. J. Agric. Econ., 71(2): 495-502.

Peng X, Marchant MA, Reed MR (2004). Identifying monetary impacts on food prices in China: A VEC model approach. Available online at: http://ideas.repec.org/p/ags/aaea04/20315.html (Accessed: 2011-03-25).

Saghaian SH, Reed M, Marchant MA (2002). Monetary impacts and overshooting of agricultural prices in an open economy. Am. J. Agric. Econ., 84: 91-103.

Scoones I, Bishi A, Mapitse N, Moerane RR, Penrith ML, Sibanda R, Thomson G, Wolmer W (2010). Foot-and-mouth disease and market access: Challenges for the beef industry in Southern Africa. Pastoralism, 1(2): 135-164.

Teweldemedhin MY (2009). Implications of trade liberalisation and economic growth for the South African agricultural industry. PhD Thesis, University of the Free State, Bloemfontein.

Teweldemedhin MY, Van-Schalkwyk HD (2010). The international trade prospective of the agriculture sector in South African. J. Dev. Agric. Econ., 2(8): 281-292. Available online at: http://www.academicjournals.org/jdae (Accessed: 2011-03-25).