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BABEŞ-BOLYAI



# OECONOMICA

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1/2009

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**UNIVERSITATIS BABEȘ-BOLYAI**  
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## DO SOCIALLY CONSCIOUS COMPANIES PROVIDE BETTER FINANCIAL PERFORMANCE ? AN EXPLORATORY STUDY

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**Abstract.** The 1987 report on “Our Common Future” by the World Commission on Environment and Development gave rise to the concept of sustainable development. However, the question remained as to what exactly is sustainable development? In recent years, the concept of sustainable development has gained popularity with its three focus areas of economic, social and environmental development, also known as the triple bottom line (TBL). The primary question under consideration was to consider whether socially conscious companies may be able to provide better financial performance and thus value creation opportunities than other companies. Several international studies have returned mixed answers to this question. This exploratory study laid the foundation for a project into possible relationships between social responsibility and corporate performances in a South African context. The study focussed on industrial companies listed in the JSE Top 40 Index, which were classified into one of two groups, namely those that adopted socially responsible reporting guidelines, and those who did not. Given the limitations of this constraint study, the analysis and comparison of the financial performance indicators of these two groups indicated that companies in the targeted group which adopted such reporting guidelines, returned better financial results than the comparative group which did not adopt these guidelines.

**JEL Classification:** M10, M14, M41

**Keywords:** corporate social responsibility, shareholders, stakeholders, sustainable development

### 1. Background

According to Arnold (2005) and Jensen (2001) a key objective of a company should be the creation of shareholder value. It is also recognised that there are other stakeholders that could impact a company’s financial performance. The stakeholders that make up this coalition of constituents have different levels of influence, with the more powerful groups being able to exert more influence on a

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company's objectives (De Wet, 2004; Mitchell, Agle, & Wood, 1997). However, because the shareholders have the option to withdraw their capital and invest it in more attractive opportunities, they will probably always receive preferential treatment (De Wet, 2004). Therefore, a company could be socially conscious and environmentally responsible, but without providing adequate financial growth, it will not be sustainable in the long run.

In 1987, the World Commission on Environment and Development published its report "Our Common Future" (WCED, 1987), which gave rise to the concept of sustainable development. The report proposed that the world should quickly design strategies that allow nations to move from the present, often *destructive processes* of growth and development, onto *sustainable* development paths. However, the question is what kind of growth is seen as compatible with sustainable development? One possible way to achieve sustainable growth is by focussing on the three main elements of sustainable development, namely economic, social and environmental development, which can also be referred to as to the organisation's *triple bottom line* (or TBL).

There is a global trend to report on areas of corporate sustainability, which include reporting on corporate social investment and environmental programmes. According to Doane and MacGillivray (2001), a company should take into account all the relevant economic, social and environmental aspects in order to be sustainable in the long run. The Global Reporting Initiative (GRI) refers to a 30,000 strong multi-stakeholder network that collaborates to advance sustainability reporting. To date more than 1,500 organisations, including many of the world's leading brands, have declared their voluntary adoption of the GRI guidelines (Global Reporting Initiative, 2007). The GRI is a collaborating centre of the United Nations Environment Programme and has pioneered the development of a widely used sustainability reporting framework, which sets out principles and indicators that organisations could use to measure and report on their economic, environmental and social performance.

## **2. Problem statement**

Shareholders wish to maximise their investment by way of dividends or investment growth, which in turn is often linked, not only to the company's present cash flow, but also its potential future cash flow (Arnold, 2005). Furthermore, shareholders can rightly expect the company to be sustainable (Arnold, 2005). However, other stakeholders can substantially impact such sustainability and value creation (De Wet, 2004; Mitchell *et al.*, 1997). Therefore, an (over-) emphasis on the company's financial performance could result in management neglecting the objectives and expectations of such other stakeholders, which can negatively impact the company's growth.

The question under consideration here is therefore whether socially conscious companies have the potential of better financial performance than those companies that do not? Following from this problem statement, two key points need to be clarified; firstly the concept of TBL and secondly the aspect of financial performance in relation to value creation.

### **The concept of triple bottom line**

Jensen (2001) states that although a company's primary objective should be to maximise its shareholders' value, it can only do so if it attends to all its

stakeholders' expectations. A company should therefore balance economic prosperity, environmental quality and social well-being to ensure long-term sustainability. Such sustainability could according to Nelson and Wilson (2003) be achieved by good corporate governance, meeting stakeholders' expectations and by delivering on well planned and implemented corporate strategies. Furthermore, sustainable businesses build on partnerships with various stakeholders, including employees, customers, shareholders, members of the local community and government agencies, and turning these partnerships into valuable resources (Nelson & Wilson, 2003).

Sustainable development could be defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (Adams, Frost & Webber, 2004). The term TBL was coined by John Elkington in 1994 to describe an organisational culture-change to ensure that routine business decisions are made within an economic, social and financial framework, and focuses not only on the economic value that a company add, but also on its environmental and social values (Elkington, 2004). Several scholars, such as Jennings (2004), Nelson and Wilson (2003) and Doane and MacGillivray (2001) discuss economic sustainability as the interpretation of how companies could stay in business, without damaging the social fabric of the community or harming the environment. Ignoring social and environmental issues may provide short-term financial benefits, but it may also be a barrier to its long-term sustainability. Companies that can effectively manage their environmental and social issues may therefore make themselves more economically sustainable. What, however, do the environmental, social and economic bottom lines each entail?

*Environmental bottom line:* The environmental bottom line focuses on the relationship between a company and the natural environment. It is used to optimise the inputs of a company by optimising the use of paper, fuel, water and electricity, as well as the minimization of waste generation. The environmental bottom line is therefore all about the impact of a company's operations on the environment (Nelson & Wilson, 2003).

*Social bottom line:* The social bottom line is used to examine and enhance the interface between a company and its stakeholders. Social performance is linked to human capital, both within and outside a company. It could include aspects such as investment in staff through good occupational health and safety practices, training and employee policies as well as investment in the local community. A company is not a stand-alone entity and is part of a local community with partnerships with many stakeholders. A key-element of social performance is therefore stakeholder engagement (Nelson & Wilson, 2003).

*Economic bottom line:* Although it may be assumed that the economic bottom line is synonymous with the financial bottom line (or profitability), there are significant differences between the two. The financial bottom line reflects historical information about the business transactions recorded in a company's financial records. The economic bottom line however, reflects the investment in human and natural resources, which impacts society at large (Jennings, 2004). As such, the economic bottom line might impact everything from employment and the provision of public services, to ensuring a sustainable and skilled workforce, to a productive and healthy community in

which the company would operate. The economic bottom line is therefore integrally linked with decisions that go well beyond the traditional understanding of the financial bottom line. In recent years investors have also started looking at long-term shareholder value of stable companies with a history of providing reliable added-value to the economy as a whole (Doane & MacGillivray, 2001).

It is important for a company to ensure that its environmental, social and economic balance sheets are in order to be sustainable. Sustainability can therefore be seen as a combination of environmental, social and economic performance. From a capitalistic perspective, economic sustainability is probably the most important, and elusive, element because even though a company could be socially and environmentally responsible, if it is not profitable, it will not be economically sustainable. Following from this, it now becomes important to consider the profitability aspects of social responsibility and sustainable development.

### **Financial Performance Measures**

When considering past international research projects in sustainability and social responsibility performance such as Cowton (2004), Guerard (1997) and Hamilton, Jo and Statman (1993), key performance indicators used would typically be based on the return on the investment. However, no specific performance indicator is seen as being the 'correct' indicator. For purposes of this exploratory study therefore, two approaches were decided upon to gauge the effectiveness of the target companies' value creation abilities. Firstly, from an accounting perspective, consideration is given to the company's ability to generate both earnings and investment returns. Secondly, from an economic perspective, consideration is given to the company's ability to generate growth in its market and economic values.

### **Accounting-based principles**

A popular financial performance measurement approach to evaluate earnings potential is the price earnings (P/E) valuation model, which suggests that a company's value is determined by a multiple of its earnings (Correia, Flynn, Uliana, & Wormald, 2007). For purposes of this study, two variations of the P/E model are used, namely the earnings per share (EPS) and headline earnings per share (HEPS).

*Earnings per share:* This ratio is determined by dividing the net profit (or loss) attributable to ordinary shareholders by the weighted average number of ordinary shares (Vorster, Koen, Koornhof, Oberholzer & Koppeschaar, 2007). The EPS ratio therefore refers to the profit attributable to the ordinary shareholders.

*Headline earnings per share:* The HEPS ratio is calculated after separation of all capital nature items from the earnings, the reason being that such items are not necessarily an indication of sustainable earnings (Vorster *et al.*, 2007).

When considering the investment return abilities, the accounting rate of return (ARR) is often considered. For purposes of this study, two commonly used permutations thereof were utilized, namely the return on assets (ROA) and the return on equity (ROE).

*Return on assets:* The ROA ratio indicates the company's profitability in relation to the assets employed and is calculated by dividing earnings with the total assets (Horngren, Sundem, Stratton, Burgstahler & Schatzberg, 2008; Correia *et al.*, 2007). For purposes of this study the earnings before interest and after tax (EBIAT) were used.

*Return on equity:* The ROE is determined by dividing the earnings after interest and tax with the equity's book value, which would according to Correia *et al.*, (2007) and De Wet (2004), consist of the issued ordinary share capital, plus the share premium and reserves.

### **Economic-based principles**

In contrast to the accounting-based models, there are a number of economic-based models that place focus on economic profits, such as the market value added (MVA) and economic value added (EVA).

*Market value added:* From an investor's point of view, the MVA is an excellent external measure of a company's performance. This is because it is a cumulative measure of corporate performance that represents the securities exchange's value assessment from a particular time onwards, based on the NPV of a company's past and projected capital projects (De Wet, 2004). The MVA is considered the difference between the company's total market value and its invested capital (IC), which is basically the fixed assets plus the net working capital (Correia *et al.*, 2007; De Wet, 2004).

*Economic value added:* EVA™, a registered trademark of Stern Steward & Co., is an internal performance measure that tries to capture the true economic profit of a company by determining the net operating profit less an appropriate charge for the opportunity cost of all capital invested in a company (Correia *et al.*, 2007; De Wet, 2004). The inclusion of a capital charge in the calculation is an important aspect of EVA. It is considered that when a company returns a profit that is less than its average cost of capital, it is not creating wealth but is in effect destroying wealth.

### **3. Research Objective**

Several international studies have been conducted to research the financial performance of so-called 'socially responsible' investments, with mixed results. For example, a research project by Guerard (1997) found no significant differences in the average return of 'ethically' screened stocks when compared to 'regular' stocks. However, using a model that integrated *value* and *growth*, Guerard (1997) did find evidence of better performance by the ethically screened stocks. Also, research by Hamilton *et al.* (1993) again found no statistically significant differences between the risk-adjusted investment return of socially responsible and conventional mutual funds between 1981 and 1990. In a more recent project, Cowton (2004) says that investors might not sacrifice much return, if any, in adopting an ethical policy. Notwithstanding the aforementioned, Jones, van der Laan, Frost and Loftus (2008) states that the majority of international studies indicate that socially responsible investment funds generally slightly under-perform the market. In South Africa there seems to be a lack of similar research into social responsibility and financial performance in a local context. Considering the social and environmental issues from a slightly different perspective, this article is not

focussing primarily on the socially responsible *investments'* performance, but rather on the TBL *reporting company's* financial performance.

This project formed the initial part of larger research project into socio-environmental accounting and its potential impact on corporate performance management and is considered to be an exploratory research project. According to Blumberg, Cooper and Schindler (2008) and Durrheim (2008), exploratory research is appropriate for the study in topic areas where the developed data are limited. Furthermore, Blumberg *et al.* (2008) says that the objective of an exploratory study is the development of hypotheses, and not the testing thereof. The overall objective was therefore to lay the foundation and to justify further and specific research into the relationship and causality between socio-environmental accounting, social responsibility and corporate performance. Supporting this objective, the secondary objective was to explore the reported financial performance differences of companies that adopted TBL reporting requirements versus companies that haven't adopted TBL.

Even though an aim of exploratory studies is the *development* of hypotheses, against the background of the earlier mentioned international studies, it is possible to formulate the following foundational hypothesis:

*H1:* There is no substantial difference in the financial performance of companies that have adopted the TBL reporting requirements when compared to companies that have not adopted such TBL reporting requirements.

#### **4. Research Method**

In order to achieve the study's objectives, both a literature study and an exploratory empirical study were conducted.

*Literature study:* The underlying literature study phase of the project involved a study of recent developments in the field of shareholder value, with specific reference to the concept of TBL. There were two parts to this discussion. Firstly, in line with TBL, some focus was placed on the *environmental, social* and *economic* performance drivers. Secondly the underlying concepts of some conventional accounting-based performance measurement models (ROA, ROE, EPS and HEPS), as well as economic-based performance measurement models (MVA and EVA) have been discussed.

*Empirical study:* The empirical phase of the study involved the analysis and comparison of the financial performance data by using the abovementioned accounting and economic-based techniques. For purposes of this study, publicly listed companies in the JSE Security Exchange's Top 40 Index were targeted. Due to data availability and time constraint concerns, the decision was made to focus on industrial companies. Within this group, it was possible identify those companies that submitted their TBL-based reports to the GRI and those companies not reporting to the GRI. It should be noted that reporting to the GRI is voluntary, and companies were able to submit their reports as from 2001 onwards. The *test group* included Barloworld, Bidvest, Mittal SA, the MTN Group, Pick 'n Pay Stores, PPC Cement, SABMiller, Sasol, Telkom and Wooltru, whilst the *control group* included Imperial Holdings, the JD Group, Nampak, Naspers, Netcare, Remgro, Richemont, Sappi, Steinhoff and Tiger Brands. The source of the financial

data was the McGregor's Bureau of Financial Analysis' database at the University of Pretoria.

Even though all the included companies are JSE listed companies, each company's relative size in terms of capitalized value, share price and earnings are different. Therefore, a straightforward comparison of R-values between the companies, such as found in the EPS, HEPS, MVA and EVA indicators, may render such a comparison less relevant. In order to enhance comparability of such scaled data, Durrheim (2008) and Steyn, Smit, Du Toit and Strasheim (1995) suggest that the z-score is a good technique to transform measurements on a scale into a *standardized* form. Therefore, in an attempt to address possible skewness of data due to the relative monetary differences in the companies' capitalized value, share prices and earning, the financial data expressed in R-value (i.e. the EPS, HEPS, MVA and EVA related data) was standardized using the following approach (Durrheim, 2008; Steyn *et al.*, 1995):

$$z = \frac{x - E(X)}{\sigma}$$

z = standardised value

x = individual value

E(X) = mean of individual values

$\sigma$  = standard deviation

## 5. Empirical results

The empirical results were obtained as outlined above and consist of the specified accounting and economic-based performance indicators.

### Accounting-based principles

The accounting-based principles used in the empirical analysis were firstly the earnings indicators of EPS and HEPS, which were standardised using the discussed z-score technique, and secondly the return on investment techniques of ROA and ROE.

### Standardized earnings per share and headline earnings per share

The EPS refers to profits attributable to each ordinary share, while HEPS excludes the impact of items of a capital nature from the earnings calculation. The results are summarized in Tables 1 and 2 respectively.

Table 1. Standardized earnings per share

	1998	1999	2000	2001	2002	2003	2004	2005	2006
Test group	-0.93	-0.83	-0.62	-0.64	-0.01	-0.12	0.35	1.19	1.61
Control group	-0.56	-0.67	0.19	-0.37	-0.37	0.13	0.04	0.45	0.95
Total	-0.74	-0.75	-0.21	-0.51	-0.19	0.00	0.19	0.82	1.28

Table 2. Standardized headline-earnings per share

	1998	1999	2000	2001	2002	2003	2004	2005	2006
Test group	-0.75	-0.98	-0.84	-0.53	-0.26	0.04	0.49	1.17	1.65
Control group	-0.56	-0.54	-0.23	-0.45	-0.13	0.08	0.28	0.57	0.98
Total	-0.65	-0.76	-0.54	-0.49	-0.20	0.06	0.39	0.87	1.31

There has been substantial growth in both the average EPS and HEPS for the total population from 1998 to 2006 with the EPS increasing by 2.02 points (from -0.74 to 1.28) and HEPS by 1.96 points (from -0.65 to 1.31). The test group's average EPS growth was 2.54 points (from -0.93 to 1.61) compared to the control group's average EPS-growth of 1.51 points (from -0.56 to 0.95). Furthermore, the test group's average HEPS growth was 2.4 points (from -0.75 to 1.65), compared to an average HEPS growth of 1.54 points (from -0.56 to 0.98) for the control group.

### Return on assets

As mentioned earlier, the ROA ratios measure the profitability of a company as a whole in relation to the total assets employed. Similar trends as seen in the EPS and HEPS results are also seen with the analytical results for the ROA, which are summarized in Table 3.

Table 3. Return on assets (% , rounded to one decimal)

	1998	1999	2000	2001	2002	2003	2004	2005	2006
Test group	11.1	9.7	13.3	10.4	13.6	11.9	15.2	18.5	16.8
Control group	11.7	12.5	23.2	16.0	10.8	10.6	10.5	14.3	14.3
Total	11.4	11.1	18.3	13.2	12.2	11.3	12.9	16.4	15.5

There has been a 36.0% growth in the average ROA for the total population from 1998 to 2006, (from 11.4% to 15.5%). However, the test group had an average ROA growth of 51.4% (from 11.1% to 16.8%), compared to an average growth of 22.2% (from 11.7% to 14.3%) for the control group for the same period under review. It is interesting to note that from 2001 to 2006, the test group had an average ROA growth of 61.5% (from 10.4% to 16.8%), while the control group's average ROA actually declined with 10.6% (from 16.0% to 14.3%). The average ROA growth for the population was 17.4% (from 13.2% to 15.5%) for the same period.

### Return on equity

The ROE measures the rate of return on ordinary shareholders equity. The results of the ROE analysis are summarized in Table 4.

Table 4. Return on equity (% , rounded to one decimal)

	1998	1999	2000	2001	2002	2003	2004	2005	2006
Test group	20.2	17.2	25.4	26.6	42.8	0.2	23.7	1315	-31.9
Control group	-14.2	256.8	65.7	19.3	29.6	16.7	48.1	31.8	33.6
Total	4.9	130.7	44.5	23.0	36.2	8.5	35.9	673.5	0.9

The total average ROE has declined with 81.6% (from 4.9% to 0.9%), for the period 1998 to 2006. However, there was no visible trend in the year-on-year growth for the total population in either the test and control groups.

### Economic-based principles

The economic-based principles used in the empirical study were the MVA and EVA performance measurement models. Upon analysing these results, similar trends as

in the accounting-based principles, are also found in the consideration of the economic-based principles.

#### **Standardised market value added**

The MVA is a good external cumulative measure of a company's performance and brings into account current investments, which could generate future profits and value. The MVA results are set out in Annexure A5 and are summarised in Table 5.

Table 5. Standardised market value added

	1998	1999	2000	2001	2002	2003	2004	2005	2006
Test group	-0.58	-0.59	-0.53	-0.46	-0.38	-0.49	0.16	0.90	1.97
Control group	-0.59	-0.24	-0.17	-0.32	-0.24	-0.51	0.11	0.89	1.07
Total	-0.59	-0.42	-0.35	-0.39	-0.31	-0.50	0.14	0.89	1.52

The test group had a growth in its average MVA for the period 1998 to 2006 of 2.55 points (from -0.58 to 1.97) compared to the 1.66 points (from -0.59 to 1.07) of the control group. The test group's growth in average MVA substantially exceeded the control group's growth for the period 2001 to 2006. During the period, the test group's average MVA increased with 2.43 points (from -0.46 to 1.97), compared to an increase of only 1.39 points (from -0.32 to 1.07) for the control group.

#### **Standardised economic value added**

The EVA is an internal measure of performance that tries to capture the true economic profit of a company and takes the weighted average cost of capital (WACC) into account. The WACC used in the empirical study is a company average over the period of the available data and was calculated by the McGregor BFA of the University of Pretoria. The EVA calculations were based on a Stern Steward adopted model, which were also calculated by the McGregor BFA. The final results of the EVA analysis are summarised in Table 6.

Table 6. Standardised economic value added

	1998	1999	2000	2001	2002	2003	2004	2005	2006
Test group	-0.63	-0.95	-0.66	-0.49	-0.40	0.34	0.44	1.11	1.25
Control group	-0.07	-0.05	-0.20	-0.22	-0.48	0.15	-0.04	0.51	0.40
Total	-0.35	-0.50	-0.43	-0.35	-0.44	0.24	0.20	0.81	0.82

The test group had a positive growth in EVA from 1998 to 2006 of 1.88 points (from -0.63 to 1.25), while the control group only returned a standardised EVA growth from -0.07 in 1998, to 0.40 in 2006 (or 0.47 points). The same trends as with MVA are also found in the period 2001 to 2006. The test group's EVA increased with 1.74 points (from -0.49 to 1.25), while the control group's EVA changed from a -0.22 to 0.40 (or 0.62 points) over the same period.

### **6. Results Interpretation**

The empirical comparison of the performance data identified a clear trend that on average, the test group reported better performance results in five of the six performance measures than the comparative group.

*Accounting-based measurement results:* In respect of both the EPS and HEPS indicators prior to the GRI adoption, the average of the control group was better than the test group. However, from 2001 onwards, when the GRI guidelines were adopted, the test group clearly outperformed the control group. In respect of the ROA, no adjustments were made to take into account the effect of any recapitalisation programmes, or the effect of the adoption of IFRS 1 on the first time adoption of International Financial Reporting Standards (IFRS, 2006a). Assuming the effects of any recapitalisation programmes and the adoption of IFRS 1 are neutral for the total population, the reported ROAs for the control were initially better than those of the test group. However, the picture was reversed after the adoption of the GRI reporting requirements. The only instance where this trend was not observed was in the case of the ROE. A possible reason for the difficulty in analysing the equity was traced to an assumption to impair all goodwill and intangible assets for the total population for the period under review. This was in accordance with IFRS 3 on business combinations (IFRS, 2006b), which affected the results for companies such as the MTN Group, Pick 'n Pay Stores, SABMiller, Netcare and Sappi.

*Economic-based measurement results:* Although the analysis of the reported MVA vales returned similar overall trends between the test group and control group, the control group did initially seem to perform slightly better. Although that both groups experienced substantial growth in the MVA from 2003, test group continued to show strong growth, whereas the control group showed signs of leveling off. When considering the EVA values, it was again found that the test group outperformed the control group, after the adoption of socially repsonsible financial reporting requirements.

Based on these results, one might quickly be tempted to assume that the adoption of such reporting guidelines would result in better financial performance. However, before making such conclusions, there are inherent limitations to this project the reader should take into consideration.

## **7. Research Limitations**

Owing to the exploratory nature of the research project, the reader should take cognisance of the fact that the above findings are subject to certain limitations. Some of the key limitations of the study include the following:

- Each organisation's environmental and social environments are unique and constantly changing, which will make it difficult to measure and compare all the relevant variables that might influence the companies;
- The evaluation was based purely on a comparison of the reported financial performance data. Softer aspects around the company's social involvement, management experience etc. were not part of this project's scope;
- The financial data was not adjusted in recognition of different accounting policies. Future studies could take cognisance of differing policies and adjust accounting data accordingly;
- There were no qualitative statistical tests performed to determine any correlation between stakeholder management and value creation, and the study also did not test the effect of causality. It is recommended that such

qualitative statistical tests be performed in future projects to determine such (if any) correlations do exist; and

- The sampling frame of 20 may be considered as too limited to allow for general inferential statistical examination of the reliability, validity and causality.

Some further points of critique against the accounting and economic approaches to performance evaluation include the following:

*Accounting-based measurement results:* A drawback of accounting-based performance measurement models is the innate shortcoming in earnings measurement, which includes i) uncertainties in the appropriateness of a particular technique, ii) differences in accounting policies, and iii) the effect of non-cash flow expenses and the write-off of expenses such as research and development costs (Hartman, 2005; De Wet, 2004; Steward, 1991). Differences in accounting policies could also make the interpretation of financial information difficult, as was seen in the ROE analysis.

*Economic-based measurement results:* The study used a straight forward comparison of EVA results, which could be considered unjust because the invested capital employed to earn EVA differs from company to company. Furthermore, there are many possible adjustments to be made in calculating the EVA, such as the capitalisation of i) research and development expenses, ii) marketing expenses or even iii) adjustments made for certain provisions. It has not been possible to do these adjustments due to a lack of sufficient data.

## **8. Research Summary**

The concept of sustainable development encompasses the three primary focus areas of environmental, social and economic development, which is also referred to as TBL. Simply put, TBL means that corporate "citizens" have a responsibility to report to all their stakeholders on more than just their financial results. Certain groups, especially shareholders, could ask about the potential impact on performance when a company has adopted TBL policies. This research project's objective was to conduct an exploratory investigation into whether socially conscious companies that focus on their economic, social and environmental bottom lines provide better value creation opportunities to its shareholders.

In order to investigate the possibility of such a relationship, conventional financial performance measures of companies which have adopted reporting requirements were compared against companies that have not adopted such requirements. The performance measures used in the analysis were ROA, ROE, EPS, HEPS, EVA and MVA. In conducting the empirical phase of the study, mostly quantitative statistical analyses were used in the evaluation and comparison of the financial performance of industrial companies listed in the JSE Top 40 Index. These companies were divided into either the test group or the control group.

Subject to abovementioned limitations, the comparison of the reported financial performances indicated that on average, the companies in the test group returned better financial results than the control group. However, the study's limitations caution against drawing against a direct link between GRI adoption and financial performance. The study's null-hypothesis is thereby accepted. Even though the findings of this study should be interpreted with caution due to the inherent limitations and shortcomings in this constrained research project, the findings do

warrant further detailed research into the possible causal relationships between social responsibility and organisational performance and subsequent shareholder value creation.

## 9. Concluding Comments

Much of the international research into this area has been conducted against a 1<sup>st</sup> World background. This paper has explored the possible relationship between financial performance and TBL in a developing economy's context. It is not claimed that companies that comply with, and submit their TBL reports to the GRI, will experience better financial performance. However, by adding both empirical and theoretical material to the area of socio-environmental accounting, this limited study can contribute insights and pointers for future work into socio-environmental accounting against the background of a developing economy.

An important next step for future research is to investigate the causal relationship between social responsibility and corporate performance. Further areas of study could be investigating other specific areas of stakeholder management, such as the impact of human resource management on the creation of shareholder value. Company staff is one of the most important stakeholders of a company, and one of the few under a company's direct control. Any other further research could also be focused on economic sustainable development and aspects which could improve or destroy sustainability. Shareholders have invested their funds to generate a return over the long-term. A company should therefore be sustainable to generate long-term returns.

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## VALUE CREATION CHAIN IN MERGERS AND ACQUISITIONS

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**Abstract.** The aim of this paper is to investigate the value creation chain and key value drivers in mergers and acquisitions (M&A). The proposed conceptual framework follows the logic of value chain based on the premise that both financial and human characteristics have an impact on value creation in M&A. Added value potentials and value drivers in both companies, acquiring and target, should be carefully analyzed as only integrative synergies create value for shareholders by harvesting added value in post-merger integration. Therefore, value creation has to be measured in free cash flow increments and its influence on corporate performance should be the centerpiece of M&A activity.

**JEL Classification:** G12, G32, G34

**Keywords:** mergers and acquisitions; value chain; corporate performance.

### 1. Introduction

Mergers are commonly defined as the consolidation of two previously separate companies into a single organization. Acquisitions, by contrast, are commonly defined as the purchase of one company by another where the buyer maintains control. (UNCTAD, 2001; Nakamura, 2005). Global M&A activity reached \$4.4 trillion in 2007 and the volume of deals in 2007 was 21 percent higher than in 2006 (Dealogic, 2008). Besides growing in their number, the size of individual deals rises to unprecedented levels where some mega deals have already surpassed a hundred billion dollar value.

The conventional wisdom has been that M&A targets are under-performers which attract capital market discipline (Bertoncelj, 2006). This perspective leads to the inefficiency hypothesis that M&A are motivated by a desire to create value by correcting and gaining from target inefficiency. A change of control and, consequently, a change of management would provide "effective strategies for better efficiency", from anticipated operating cost containment and better access to financial markets to higher returns on investment projects (Weston and Weaver, 2001). In other words, the present value of all performance enhancements

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attributable to management change would result in the increase in value primarily from managing the assets more efficiently – higher cash flows from the assets and efficiency growth (Damodaran, 2005).

Changing market conditions, intensified global competition, technological innovation and increasingly shorter product life cycles mean that companies are having to re-examine the traditional methods and strategies for expanding their businesses through M&A. M&A can be understood as a corporate strategy at an international as well as national level to better cope with new global conditions (Cassiman and Colombo, 2006).

In the push for rapid organizational growth billions of dollars are spent each year on M&A but only with mixed results. Empirical studies of many scholars suggest that more than half of them fail to produce results; at best they are break-even situations (Jemison and Sitkin 1986; Covin et al. 1996; Marks and Mirvis 1992, 1998; KPMG 1999; Schraeder and Self 2003; Bertoncelj and Kovac, 2007; Hassan et al. 2007).

In the first four to eight months that follow the deal, productivity may be reduced by up to 50 percent (Huang and Kleiner 2004). A major McKinsey & Company study found that 61 percent of acquisition programs were failures because they did not earn a sufficient return (cost of capital) on the funds invested (Sirower 1997). Between 55 and 77 percent of all M&A fail to deliver on the financial promise announced when the merger was initiated and some 40 percent of cross-border mergers among large companies end in what is termed total failure (Carleton and Lineberry 2004).

A recent Deloitte Research-EIU M&A survey (2007) shows that only 49 percent of corporate acquirers in the U.S. said that over half their deals hit the mark on a timely basis. Given the amount of subjectivity involved, this is a surprisingly low self-rating.

Therefore, the motivation for M&A activity, as well as the strategic value-creators that drive the deals in developed and developing economies, are of interest. But how to succeed at an activity in which the odds of success are so slim? Is there a recipe for success?

## **2. Value creation in M&A – A conceptual framework**

Empirical studies of consummated deals and their integration bring us to the conclusion that the high failure rate is a consequence of the current management and governance approach (Bertoncelj, 2007). A new, integrated approach which focuses on companies' core competences and values can enhance success rate in M&A through balanced management of key success factors (KSF), thus delivering financial benefits from the deal (KPMG, 1999; Bertoncelj and Kovac, 2007).

### **2.1. Internal and external resources in M&A**

Each company is a collection of unique resources that provides the basis for its M&A strategy and the primary source of its returns. Resources, tangible and intangible, are company's inputs, such as capital, equipment, the skills of employees, patents, and talented managers. In M&A, only synergistic combination and integration of sets of resources form competitive advantage. According to this view, a company's competitive advantage derives from its ability to assemble and

exploit an appropriate combination of resources by developing existing and creating new resources in response to rapidly changing market conditions.

We identify two major categories of resources in M&A:

- Internal resources
  - Hard (financial) factors
  - Soft (human) factors
- External resources
  - Local factors

## 2.2. Capabilities and KSF in M&A

KSF are useful tool that can be controlled by management in order to achieve desirable outcomes (Rochart, 1979). Similarly, Turner (2004) claims that if KSF are adequately identified and controlled, the chances of success can be greatly increased. The topic of KSF has received significant interest in the last couple of decades especially when it turned into empirical research (Pinto and Prescott, 1990; KPMG, 1999; Bertoneclj and Kovac, 2007).

More KSF could mean higher degree of success in projects (Fortune and White, 2004). Additionally, Hoang and Lapumnuaypon (2008) suggest that KSF developed later are more complex than those of the previous decade since more recent success factors cover both hard and soft aspects. Soft issues should be carefully considered, as human capital plays a critical role in M&A although it often takes only second place to commercial and financial considerations (Huang and Kleiner, 2004).

Figure 1. KSF in M&A

KEY SUCCESS FACTORS (KSF)	
SOFT KSF	HARD KSF
MANAGEMENT TEAM	ACQUISITION SEARCH
INTELLECTUAL CAPITAL	DUE DILIGENCE
ORGANIZATIONAL CULTURE	FINANCIAL RESOURCES
COMMUNICATION	INTEGRATION PLAN

Bertoneclj (in press) suggests, based on the study of M&A activity in post-transition economies, that KSF differ in their importance for individual companies, but all aforementioned KSF are considered relevant for the corporate performance. The study also suggests that hard KSF are considered more important than soft KSF to increasing the success rate of corporate combinations. However, the differences in mean values of compared KSF are statistically not significant, only a weak correlation between hard and soft KSF can be observed; the more distinctive are the hard KSF the less expressed are the soft ones.

## **2.2.1. Soft KSF**

### **2.2.1.1. Management team**

On the market for corporate control a competition among managerial teams and the constant fight for the right to manage assets of companies can be observed (Jensen and Ruback, 1983). The management team should be selected early in the process; if possible, already in the pre-deal phase. Use of various assessment methods to select talents is critical for synergy realization in the post-merger integration. Research indicates that up to half of the managers in companies involved in M&A leave within three years (Galpin and Herndon, 2000). Brain drain can be very costly and finding new competent managers and experts can be time consuming. Early and full information of the new vision and strategy of the combined operations, along with the opportunities for the carrier development, should be presented to key staff, otherwise for those who remain confusion over differences in decision-making styles leads to infighting (Harding and Rouse, 2007). Those companies that prioritise the selection of the management team at the pre-deal planning stage are 26 percent more likely to have a successful deal (KPMG, 1999).

### **2.2.1.2. Intellectual capital**

Understanding the development of intellectual capital and its optimal management is very important for value creation and sustainable success in M&A. Intangible, not tangible, assets are the critical differentiators of a business enterprise and intellectual capital is the added value lever of the knowledge economy (Fitz-enz, 2000; Lajara, Lillo and Sempere, 2002; Koh and Gunasekaran, 2006; Thomas and Allen, 2006; Kundu and Rani, 2007). Intellectual capital evaluation (human resources due diligence) should be completed early in the process and results should be integrated in the post-acquisition plan with the fundamental aim of contributing to reaching a high level of effectiveness as well as reaching the aims of an organization. It is the company's members that possess tacit knowledge that characterizes intellectual capital of a target company necessary to perform planned activities in the post-acquisition period.

### **2.2.1.3. Organizational culture**

Organizational culture can be a make-or-break factor in M&A. In the past it was widely believed that organizational culture was critical in M&A but not much could be done about it to avoid culture clashes. Shrivastava (1986) claims that in order to achieve the best possible outcome of M&A, the two companies should be integrated to make them as similar as possible by attaining a mutual organizational culture. In reality, acquired companies are often forced to adapt to the acquiring company's culture and routines (Napier et al, 1989). Culture clash is a term that is frequently used when there is a need to explain why M&A failed to produce results. Cultural assessment in M&A should start with the cultural due diligence process of the acquirer. It is the acquiring company that should first be at centre-stage, and its intent should be clearly defined before any M&A activity. Later in the M&A process it is followed by the cultural due diligence of the target company. The importance of cultural due diligence in M&A has given rise to a need for cultural due diligence (Carleton, 1997) that is equally as important a part of the overall investigation of a target as traditional legal and financial due diligence.

#### **2.2.1.4. Communication**

M&A require proactive and relevant communication to all stakeholders that secures their acceptance and support. Early communication should minimize uncertainty and perplexion, on the other hand no communication at all (management's silence) makes matters even worse as it creates rumours. An absence of formal, accurate and on-time communication results in low motivation and morale of employees. Acquiring companies should comply with four rules of effective transition communication: no secrets, no surprises, no hype, and no empty promises. They should have an integrated information strategy in place before the start of an M&A process. The KPMG survey confirms that companies who prioritise communications are 13 percent more likely to be successful than the average (KPMG, 1999).

#### **2.2.2. Hard KSF**

##### **2.2.2.1. Acquisition search**

Choosing the right partner is central to M&A success (Hubbard, 2001; Hitt, Harrison and Ireland, 2001; Bruner, 2004). An acquisition search is non-linear and even unruly (Bruner, 2004). Tens, sometimes hundreds, of prospective targets are identified in the screening process, but only few are selected for further evaluation. The ratio between potential deals and completed deals is very small, therefore the efficiency of the acquisition search is crucial and can yield significant improvements in end-results. Tacit knowledge and skills with capital transactions of in-house experts or internationally seasoned investment bankers is central to the M&A process. Private information about M&A opportunity means that there is a very low degree of competition among prospective acquirers (information asymmetry) and a high likelihood of a more advantageous price. The buyer's "sweet spot" is the world of private information (Bruner, 2004). Still, primary research and preliminary evaluation of promising arenas for deals, and an increased total number and frequency of searches is the right, pro-active way that increases the chances of doing a successful deal.

##### **2.2.2.2. Due diligence**

Research shows that ignorance of potential problems is one of the main causes of failure in M&A (Early, 2004; Schraeder and Self, 2003; Hakkinen and Hilmola, 2005; Koh and Gunasekaran, 2006; Harding and Rouse, 2007). Due diligence is in fact a detailed investigation of a target company. It supports valuation, negotiations, structuring, and post-acquisition planning. Duly diligent investigators should uncover as many as possible risks (if not all of them) associated with the transaction, as risk bearing can be very costly for acquirers. In the real world, acquiring companies choose between broad due diligence and narrow due diligence investigation plus representations and warranties. An in-depth investigation means higher costs but it yields better insight; it uncovers "surprises now" vs. "surprises later" usually associated with a less detailed review. Insightful due diligence would include financial, tax, legal, intellectual capital, sales and operations, property, environment, and organizational culture investigation. In any case, the acquirer has to know what he is acquiring and that there are "no hidden skeletons in the closet".

### **2.2.2.3. Financial resources**

The method of payment in M&A is mainly cash, stock, debt, or some combination of the three. The form of payment is related to the size of the transaction – in large transactions (jumbo deals) the method of payment is most often stock; in transactions where large companies acquire small companies the form of payment of choice is mainly cash. The form of payment and financing practices vary with the economic cycle; changes in interest rates and stock prices are strongly associated with changes in M&A deal design over time (Bruner, 2004). Another aspect is the financing assessment of deals. The seven levers of financing an M&A transaction are mix, maturity, basis, currency, exotic terms, control, and distribution (Bruner, 2004). Most acquiring companies exhibit a pecking order of funding their transactions through retentions of profits, then through bank debt, and finally through new stock issues. In other words, internal sources of capital are used before going to the capital market. An optimal capital structure would be one that maximizes shareholder value; one that lowers the weighted average cost of capital and increases the enterprise value, which is the ultimate goal of any M&A activity.

### **2.2.2.4. Post-merger integration plan**

Post-merger integration (PMI) is where envisioned synergies and expectations are realized or broken. Failing to recognize PMI issues at the bargaining table or in the analytical phase of the work can create enormous problems later on (Bruner, 2004). There are two phases of integration implementation: planning and execution. Careful planning is crucial in the pre-deal phase, but successful implementation in the post-deal phase has speed, determination, and good communication in common (Bruner, 2004). One of the deadly sins that have to be avoided is to delay the start of PMI and drag out its finish. Managers often postpone decisions or are blocked from making them; integration stalls and productivity declines (Harding and Rouse, 2007). PMI is in fact transformation and M&A are major corporate makeovers. PMI is vital to the success of any M&A. In fact, PMI was in 53 percent of all unsuccessful deals the prime reason for failure (Habech et al., 2000). There is no standard blueprint available for all M&A; PMI plans should be built on the business rationale of specific transactions. Management has a “honeymoon” period of some 100 days after deal completion to take hold of the business and start delivering benefits (KPMG, 1999).

## **2.3. Three major operations of manufacturing company**

We identify three major operations (activities) in “standard” manufacturing company:

- Marketing and sales (M&S)
- Manufacturing
- Research and development (R&D)

## **2.4. Integrative synergies in M&A**

Managers have to know the core competencies and values of their companies. They need to identify the strong business nuclei with added value

potentials of their companies and map them. Based on the core competencies and values, they should select appropriate targets by identifying targets with added value potentials (AVP). The AVP are foreseen areas of synergies (real and measurable improvements), on which an acquiring company should focus in order to unlock the value from combined business. Synergies have to be defined in economic terms; where synergy happens, the whole is greater than the sum of the parts, the so-called 1+1=3 effect.

The KPMG survey shows that pre-deal synergy evaluation emerged as the prime hard success factor; one which can enhance the chance of success to 28 percent above average (KPMG, 1999). Too often, the synergies are defined in vague strategic terms instead of real, measurable improvements in competitive advantage (Sirower, 1997; Bruner, 2004; Early, 2004; Jagersma, 2005; Ficery, Herd and Pursche, 2007). Over-estimating synergies is one of top reasons for failure in M&A; therefore, synergy assessment is critical in valuation analyses. True synergies create value for shareholders by harvesting benefits from M&A that they would be unable to gain on their own (Bruner, 2004).

In other words, combining strong business nuclei of both companies would enhance existing strong added value potentials, add new added value potentials and strengthen existing weak added value potentials. By combining strong business nuclei of both organizations we build a "new organism, with unique organizational culture". Controlling all of these added value potentials enables an educated decision to be made about the deal. Failing to ensure real and measurable improvements in competitive advantage through clearly defined AVP increases the odds of a bad decision (synergy trap).

The most often stated improvements in competitive advantage include revenue enhancement, cost reduction, tax reduction, asset reduction and WACC reduction. Combining two companies in "Newco" may result, among others, in revenue enhancement synergies, cost reduction synergies, asset reduction synergies, tax synergies, and financial synergies (see Table 1).

Added value potentials assessment of both companies, acquiring and target, should be the centrepiece of M&A analysis as it addresses the relationship between price and value of the target plus the value of synergies. The paid price should be lower than the sum of the stand-alone value of the target and value of synergies. Synergy evaluation requires detailed due diligence, it should not be based on mere guesswork or, even worse, be dictated to make the deal look better. M&A should be driven by all factors which impact the added value, i.e. synergies realization. The easiest way to lose the acquisition game is by failing to define synergies in terms of real, measurable improvements in competitive advantage (Sirower, 1997). The level of realization of some intended M&A objectives is shown in Table 2.

Table 1. Sources of synergies

Str. Objective	Integrative Synergy	Source of Synergy	FCF Increment	Major Issues
		(1) Revenue (2) Cost (3) Cash	(a) more cash-in (b) less cash-out	(I) Customer loss (II) Culture resistance (III) Organizational politics (IV) Departure of employees
Growth	Increase market share Enter new markets <b>Access new products</b>	(1) High (1) Moderate to high (1) High	(a) (a) (a)	(I), (II), (IV)
Operating Margin	Cost reduction - M&S - <b>Manufacturing</b> - R&D	(2) High (2) Moderate to high (2) Moderate to high	(b) (b) (b)	(II), (III), (IV)
Investment-Capex	Access new technology Access PP&E	(2) Moderate to high (3) Moderate	(b) (b)	(III), (IV)
Liquidity	Working capital reduction - <b>Inventory</b> reduction - <b>Suppliers</b> (AP increase) - Customers (AR reduction)	(3) Low to moderate (3) Moderate (3) High	(a) (b) (a)	(I), (III)
Taxes	Tax/contribution reduction - <b>Wages</b> - Corporate	(2) High (2) Moderate to high	(a)	(II), (III), (IV)

Table 2. Intended vs. achieved M&A objectives

Objectives	Intended	Achieved
Access to new markets	76%	55%
Growth in market share	65%	54%
Access to new products	46%	56%
Reduction in operating expenses	38%	39%
Access to suppliers	12%	27%
Reduction in distribution costs	26%	25%
Access to know-how	15%	21%
Access to new brands	24%	72%
Access to new technologies	23%	55%

Source: Adapted from Feldman and Spratt, 2001, p.9

Value creation is the best gauge of synergies, only true synergies create value for shareholders by harvesting added value from M&A. Objectivity above all is here the imperative for wise M&A decisions and investment.

## 2.5. Value drivers in M&A

After takeover or reshuffling, existing practices would be changed and better management policies applied. Performance enhancements are the present value of all value increasing changes after a change of control and corporate restructuring in M&A (see Figure 2).

Figure 2. Free cash flow components and value drivers

FCF Components	FCF Value Drivers	Desired FCF Increment
Revenues	Sales growth	More
Operating costs	Cost containment	More
EBIT	Operating margin	More
Tax on EBIT	Cash tax rate	Less
Capital expenditure	Additional investment	Less
Working capital	Additional investment	Less

The value of control is comprised of two components – change in value by implementing new management policies and the probability that such change can actually occur in real life (Damodaran, 2005). In M&A, value estimation should play a central role. Acquiring companies have to determine a fair market value for targets before making their bids, the same has to be done by targets themselves before accepting or rejecting offers.

The value of control can be defined as the value of a company after restructuring (“optimal” value) less the value without restructuring (“as is” value). The »as is« value is also called the stand alone or status quo value of a company managed by incumbent executives. «Optimal» value refers to new management and expected improvements.

The strategic challenges a company faces in today’s competitive environment cannot be addressed exclusively by mathematical models. Computer analysis only helps develop decision support tools. A profound understanding of a company and its industry is the foundation for strategic and financial planning. A lot of research and analysis is required to put together a quality business plan. The analyst should base estimates on forecasts of the future, rather than on past results. Obviously, the past might be a good indicator of the future, but past results cannot be simply extrapolated into the future without thorough research and focus on economic reality. Conventional accounting and reported financial results may reveal relatively little about the true economic performance of the company. Cash flows as an estimate of the economic performance of a company is an appropriate approach.

In anticipated change of control through M&A, certain improvements in PMI plan are envisioned. New management policy takes place immediately after

change of control, e.g. sales growth rate increase in the next five years, operating margin improvement, investment increase in fixed assets due to required modernization of plants and operating expense decrease, cost of capital decrease due to the optimisation of capital structure (utilization of unused debt capacity), investment rate remains unchanged (entire plow back), etc.

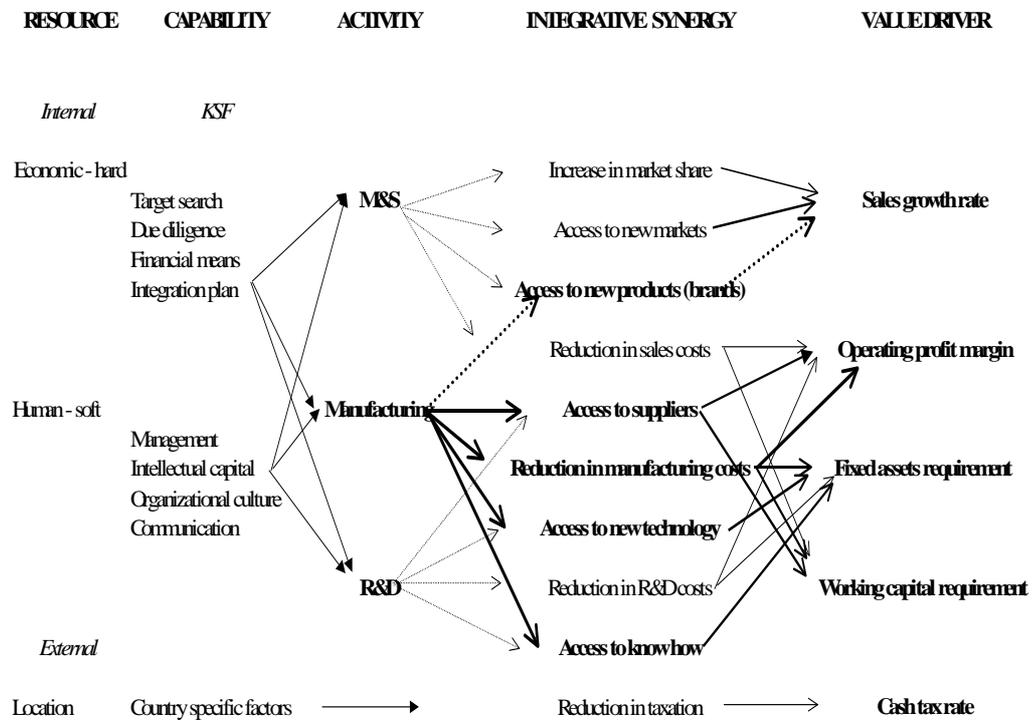
In other words, a company is expected to be better managed after a change of control. It is important to define all key value drivers, before and after change of control. However, only reasonable economic expectations should be built into future forecasts. Eventually, forecasted enhancements have to materialize in performance gains by competing better in today's competitive environment. Therefore, a realistic (and not optimistic) approach is recommended and expected performance improvements have to be clearly quantified in a valuation process.

The efficiency of the operations should be analysed on the basis of processes such as activity-based cost (ABC) accounting in order to identify areas for potential improvement or areas to leverage and capitalize on. Operating performance, from the efficiency standpoint, is measured with the following criteria:

1. Sustainable growth in operations
  - Achieve sustainable organic growth of core business
  - Inorganic growth alternatives: Mergers & Acquisitions, Joint Ventures
2. Corporate efficiency
  - Establish mean and lean organization
  - High operating margins
3. Cash management
  - Efficient working capital management
  - Accretive capital expenditures
4. Capital structure
  - Optimal Debt to Equity ratio
  - Dividend policy
  - Recapitalization

Sound managing practices are the right way of doing business and at the same time good defensive tactics. In other words, corporate performance should meet or exceed expectations. Anything contrary to that is regarded as corporate inefficiency. In order to enhance the value of a business, management has to focus, among others, on growth, operations efficiency, working capital requirements and capital investments into operations (see Figure 3).

Figure 3. Value chain in M&A



### 3. Discussion and managerial implications

Every manager has a profound interest in creating value with M&A, but a new integrated approach is required in order to enhance success rate. Expectations have changed since 1990s when M&A was expected to deliver cost reductions toward achieving projected growth targets nowadays (Perry and Herd, 2004). Despite their popularity only about half of all M&A actually achieve the desired strategic or financial objectives. Cultural differences, management deficiencies, lack of communication, poor business fit, among others, are all closely aligned with less actual shareholder value than initially planned.

The proposed conceptual model is based on the premise that both, hard (financial) and soft (non-financial or human) characteristics have an impact on the success of M&A activity (Cartwright and Cooper, 1995; KPMG, 1999; Bruner, 2004; Bertoneclj and Kovac, 2007). M&A should be carefully planned and nothing should be left to chance. We argue that an important reason contributing to the high failure rate in M&A lies in neglecting the integrated approach of balanced management of hard and soft KSF by managers of acquiring companies.

In-depth operational due diligence investigation should be seen not only as data gathering but as well as part of acquirer's risk management. The value of due diligence research is even greater if uncertainty surrounds the target, so it comes as no surprise that due diligence ties in most researches as the most important success factor. The integration process is the key to making M&A work; not until the two companies, acquiring and target, start to work together toward mutually defined objectives can value be created.

In our view, more attention has to be paid to soft KSF in M&A as they are essential for success of any business combination. Incorporating both, soft and hard KSF, into acquisition and integration plans of acquiring companies should enhance the success rate of M&A. The integrated approach makes M&A work better as it combines economic performance with non-economic (soft) factors.

We are aware that there is a cluster of other variables influencing the aforementioned conclusions and reason that further longitudinal and international studies and in-depth analyses are needed. However, our analyses provide a framework for a promising investigation in that field.

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## LE CONSERVATISME DE LA COMPTABILITÉ: QUELQUES APPROCHES DANS LA LITTÉRATURE ÉCONOMIQUE

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**Abstract.** Conservatism in accounting imposes stronger verification requirements for the recognition of gains than for losses, and produces earnings that reflect bad news in a timelier fashion than good news. Explanations for the existence of conservatism posit that it benefits the users of financial reports, as it increases firm value by constraining management's opportunistic payments to themselves or other parties. Corporate governance plays an important role in the implementation of conservatism.

**JEL Classification:** M41

**Keywords:** accounting conservatism, corporate governance, financial information

### 1. Introduction

Le but des rapports financiers conservateurs a été de faciliter d'une manière efficace les contrats entre les dirigeants et les actionnaires en présence des problèmes d'agence (Ball, 2001, Watts, 2003). Les problèmes d'agence entre les dirigeants et les actionnaires se posent essentiellement à partir de la séparation de la propriété et de contrôle lorsque l'identité des gestionnaires est distincte de celle des actionnaires (Jensen et Meckling, 1976). On mesure la séparation de la propriété et le contrôle par le pourcentage détenu par managers dans l'entreprise.

L'objectif de ce papier est d'examiner les études et les conclusions concernant la relation entre la demande de conservatisme et la séparation de la propriété et de contrôle. Le conservatisme de comptabilité implique le recours à des normes plus strictes pour la reconnaissance de mauvaises nouvelles comme pertes et les bonnes nouvelles comme les gains. Le conservatisme a été émis comme hypothèse pour faciliter les contrats entre les dirigeants et les actionnaires. Dans le cadre de la séparation de propriété et du contrôle des opérations de l'entreprise ce qui est caractéristique pour une grande majorité des entreprises américaines et européennes c'est le fait que les gestionnaires ont des incitations pour le transfert de la richesse pour eux-mêmes auprès des actionnaires.

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Ces incitations sont exacerbées par les gestionnaires avec des horizons généralement limités. Ce qui est très important c'est le fait que les gestionnaires, dans leurs efforts pour le transfert de la richesse pour eux-mêmes, détournent leur attention de la création de valeur pour les actionnaires et génèrent de lourds coûts pour l'entreprise. La littérature a fait valoir que le règlement ex-post avec les responsables, dès qu'ils ont fait des distributions excessives à eux-mêmes est difficile, ce qui implique que les gestionnaires bénéficient d'une responsabilité limitée.

Watts (2003) propose que la comptabilité conservatrice permet de résoudre des questions à d'horizons limités et des responsabilités limités. Les normes asymétriques de vérification supposent que la valeur comptable à tout moment sous-estime la valeur des ressources disponibles pour des distributions. Liant l'indemnisation à l'évolution en valeur, ou de gains, ainsi que les rapports conservateurs pénalisent efficacement les gestionnaires à la valeur de leurs mesures de réduction et reportent leur indemnisation jusqu'à ce que les bénéfices soient réalisés. Cela réduit la capacité des gestionnaires d'exagérer les évolutions cumulatives de la valeur de l'entreprise et permet d'éviter le port en coûts lourds associés avec le transfert de la richesse des gestionnaires plutôt que la gestion optimale de l'entreprise.

Un problème abordé par le conservatisme est discuté dans Ball (2001). Il propose que les gestionnaires aient souvent des incitations à retarder l'élaboration des projets parce que ces projets contribuent aux gains positifs et actuels et également aux avantages des gestionnaires privés tel que le prestige de superviser les grandes entreprises. La reconnaissance des pertes en temps voulu, incite les gestionnaires à temps dans leurs décisions de licenciement. En outre, la reconnaissance des pertes futures en temps voulu, fournit également des facteurs dissuasifs pour les gestionnaires d'entreprendre une valeur négative de valeur actualisée nette (VAN) des projets pour le bien du secteur privé et pour les prestations.

Les problèmes tels que ceux qui ont été examinés in Watts [2003] et Ball [2001] sont en croissance essentiellement lorsque les intérêts des dirigeants et des actionnaires ne sont pas alignés. Si le conservatisme joue vraiment un rôle dans la lutte contre les problèmes entre les dirigeants et les actionnaires, alors on suppose que si l'alignement d'intérêts entre les dirigeants et les actionnaires est plus petit, la demande pour le conservatisme est plus haute. Il est reconnu depuis longtemps que le conservatisme et la propriété des gestionnaires des intérêts sont moins alignés avec les actionnaires quand il y a une plus grande séparation de propriété et de contrôle.

Le conservatisme est potentiellement utile dans la gouvernance d'entreprise de plusieurs façons. Premièrement, il aide à prévenir les excès de paiements aux gestionnaires (Watts, 2003). Deuxièmement, il fournit aux gestionnaires des mesures d'incitation pour éviter de prendre des valeurs négatives de VAN sur les projets (Ball, 2001; Ball et Shivakumar, 2005). Troisièmement, il augmente la probabilité que les gestionnaires abandonnent ou ferment les projets avec une VAN négative car il génère des signaux à temps qui peuvent susciter de nouvelles enquêtes par le conseil (Ball, 2001; Watts, 2003). Ces avantages potentiels du conservatisme en matière de gouvernance suggèrent une relation positive entre la force de la gouvernance et du conservatisme.

Si avant, un certain nombre d'études ont examiné la relation entre les caractéristiques du conseil d'administration et la qualité des rapports financiers, seulement un étude préalable, Beekes et al. (2004), examine la relation entre le conseil d'indépendance et le conservatisme. Par exemple, Beasley (1996), Dechow et al. (1996) et Farber (2005) postulent que le pourcentage des administrateurs externes est négatif en relation avec les risques de fraude. Peasnell et al. (2000), Klein (2002b), et Xie et al. (2003) ont affirmé une relation négative entre le pourcentage des administrateurs externes et des procurations pour les salaires de gestion. Wright (1997) a rédigé l'un des documents qui décrit une relation positive entre le pourcentage du directeur extérieur et les taux analystes de la qualité des rapports financiers.

## **2. Le rôle du conservatisme dans la gouvernance d'entreprise**

Le conservatisme a été un attribut important de la pratique comptable, qui est définie traditionnellement par le fait de "n'anticiper aucun profit, mais d'anticiper toutes les pertes" (Bliss 1924, pg.110). Anticiper les bénéfices signifie l'enregistrement des profits avant la demande de leur sécurité juridique associée au flux de trésorerie futur et avant que les recettes soient vérifiables (Watts 2003a). Financial Accounting Standards Boards (FASB) Statement of Concepts n° 2 justifie ce comportement en définissant le conservatisme comme «une réaction prudente à l'incertitude pour essayer de faire tout ce qui est possible de sorte que les incertitudes et les risques inhérents à des situations professionnelles soient suffisamment pris en compte " (FASB 1980, pg.36). Beaucoup de personnes interprètent cela comme une orientation traditionnelle de choisir entre différentes méthodes de comptabilisation des opérations similaires. Kieso, Weygandt et Warfield (2001, pg. # 50) affirment que le " conservatisme signifie de choisir la solution qui sera la moins susceptible pour la surévaluation des actifs et des revenus en cas de doute. "

Dans la littérature scientifique récente, Basu (1997) interprète que le conservatisme représente la tendance du comptable d'exiger un degré plus élevé de vérification et de reconnaître les bonnes nouvelles à titre de gains que de reconnaître les mauvaises nouvelles comme pertes. En d'autres termes, le conservatisme peut être défini du point de vue de la comptabilité comme "la reconnaissance asymétrique de plus-values latentes et pertes signalées aux revenus". En s'appuyant sur cette interprétation, Basu (1997) pose le problème que les comptables reconnaissent les mauvaises nouvelles concernant les revenus plus rapidement que les bonnes nouvelles. Ainsi, si nous supposons que les équités intègrent efficacement les retours de bonnes et de mauvaises nouvelles sur le futur flux de trésorerie des entreprises, nous nous attendons à ce que la pente coefficient R2 et dans une régression des gains sur inattendue du rendement est plus élevé pour les entreprises avec des résultats négatifs inattendus retours (proxy pour "mauvaise news ") que pour ceux qui ont des rendements positifs inattendus (proxy pour" bonne nouvelle "). Les résultats empiriques de Basu (1997) sont compatibles avec cette prédiction. Les mesures de Basu ont été utilisés dans de nombreuses études pour évaluer l'ampleur de la comptabilité conservatrice (Givoly et Hayn 2000, Ball et al. 2000, 2003, Chaney et Philipich 2003, Krishnan 2003a, Francis et al. 2004, etc).

Il est essentiel de comprendre la différence entre le concept traditionnel du conservatisme de la comptabilité et l'asymétrie présenté par Basu (1997). La littérature est très récente et la terminologie est parfois incompatible à travers toutes les études. Dans cette article sera utilisée la terminologie de conservatisme inconditionnel et conservatisme conditionnel.

Le conservatisme inconditionnel résulte de l'application des principes ou des politiques comptables généralement acceptés (GAAP) qui réduisent les revenus des indépendants, ce qui signifie que les aspects du processus comptable ont déterminé au moment de la acquisition des actifs et des passifs une sous-évaluation prévue des actifs. On peut donner quelques exemples de conservatisme inconditionnel comme la charge immédiate de la plupart des coûts internes des actifs incorporels, l'amortissement accéléré des immobilisations et de l'équipement, et les coûts comptables historiques pour les projets avec une valeur actuelle nettement positive.

Le conservatisme conditionnel, d'autre part, implique une reconnaissance asymétrique de mauvaises nouvelles par rapport à de bonnes nouvelles. C'est à dire que les valeurs sont écrites sous des circonstances défavorables, mais pas écrites en vertu des circonstances favorables. Quelques exemples de conservatisme conditionnel sont : la valeur la plus basse du coût ou la règle comptable de l'inventaire, la dépréciation comptable des immobilisations corporelles et incorporelles et la reconnaissance asymétrique des pertes contingentes et des gains contingents.

La confusion entre les versions inconditionnelles et conditionnelles de conservatisme aide à expliquer pourquoi le conservatisme est une propriété controversée de la comptabilité, en dépit de sa longue influence dans la pratique (Ball et Shivakumar 2005). Une preuve pour cette affirmation est la déclaration de Basu (1997) (American Institute of Certified Public Accountants (AICPA) 1970, para.171). "Souvent, les actifs et les passifs sont évalués dans un contexte de fortes incertitudes. Historiquement, les gestionnaires, les investisseurs et les comptables ont généralement préféré que les erreurs de mesure possibles soient dans le sens de la litote, plutôt que dans le sens de la surestimation du revenu net et de l'actif net ... "

Plus tard, cependant, le FASB a semblé désapprouver le concept ci-dessus, car il cite la version du conservatisme inconditionnel. "La convention de conservatisme, qui a été une fois exprimée comme „ne pas anticiper les bénéfices mais anticiper toutes les pertes”, mis au point à une époque où les bilans ont été considérés comme la première (et souvent l'unique) déclaration financière et où les détails de bénéfices ou d'autres résultats d'exploitation ont rarement été prévus ... "(FASB 1980, par. 93). Il est reconnu que dans le cadre des deux définitions du conservatisme, ceteris paribus, les frais plus élevés et les revenus faibles conduisent à une baisse de l'équité à cause de la connexion entre le bilan et la situation des revenus.

La littérature sur le conservatisme inconditionnel met davantage l'accent sur la difficulté de valorisation de certains types d'actifs et des passifs et de déterminer leurs effets sur les revenus futurs, tandis que la littérature sur le conservatisme conditionnel met l'accent plus sur l'amélioration de l'efficacité. En raison des accents différents, la littérature sur les deux types de conservatisme a été largement séparée.

Récemment les chercheurs ont commencé à étudier l'interaction entre les deux types de conservatisme. Par exemple, Basu (2001) note que dans la presse étrangère les méthodes comptables de répartition moins conservatrices sont plus susceptibles d'entraîner des actifs, et, par conséquent, une plus grande asymétrie axée sur le conservatisme. En particulier, les actifs seront écrits lorsque les valeurs actuelles du marché sont inférieures à leur valeur comptable. De même, l'application du coût plus bas comme règle du marché est plus susceptible de se poser lorsque les entreprises adoptent la méthode d'inventaire "premier entré premier sorti" (FIFO) que lors de l'adoption de la méthode "dernière entré premier sorti" (LIFO).

Beaver et Ryan (2005) ont développé un modèle général pour le conservatisme conditionnel et celui inconditionnel. Le modèle capte le fait que le conservatisme inconditionnel est une source primaire de bonne volonté, on peut dire une forme de "Comptabilité mou" qui prévaut sur l'application de conservatisme conditionnel jusqu'au moment quand le rumeur est suffisamment mauvais pour utiliser ce mou. En d'autres termes, le conservatisme inconditionnel est déterminé par l'acquisition des actifs et des passifs et de cette façon il précède le conservatisme conditionnel.

Le conservatisme de la comptabilité a été observé pendant des siècles, mais ils existent des controverses importantes concernant le problème si le conservatisme est souhaitable comme un attribut de la comptabilité. Giner et Rees (2001) soulignent que le conservatisme ne doit pas être considéré comme une caractéristique nécessairement souhaitable ou indésirable. Ball et al. (2000) concluent que la demande pour le conservatisme est universel parce que les comptables et les vérificateurs trouvent que les informations négatives des gestionnaires sont plus crédibles que les bonnes nouvelles, les intervenants sont plus concernés de recevoir rapidement les mauvaises nouvelles que les bonnes nouvelles, et les régulateurs sont également préoccupés par l'identification rapide du problème. Demski et Christensen (2004) ont élaboré un modèle pour montrer que les utilisateurs des états financiers demandent des informations plus amples quand un gestionnaire réclame de bonnes nouvelles au lieu de mauvaises nouvelles (c'est-à-dire, surveillance asymétrique).

Watts (2003a) résume et classe quatre explications pour les rapports conservatifs. Tout d'abord, le conservateur de rapports se pose parce que c'est une mesure nécessaire et un mécanisme efficace employés dans les entreprises et leurs contrats avec les différentes parties à éviter le risque moral problème causé par l'asymétrie de l'information. Cette explication suggère que le conservatisme peut contraindre le comportement opportuniste de gestion et peut compenser les biais du manager dans l'évaluation des actifs, qui, à son tour, augmente la valeur de l'entreprise partagée entre toutes les parties.

Deuxièmement, les frais de justice asymétriques dans l'évaluation de l'actif net d'une entreprise motivent les rapports conservatifs parce que les actifs nets sousévalués sont moins susceptibles d'induire des frais de justice que les actifs nets surévalués. Troisièmement, les conservateurs donnent des avantages fiscaux pour retarder la reconnaissance du chiffre d'affaires et d'accélérer la reconnaissance des dépenses qui contiennent le paiement de l'impôt. Enfin, le conservatisme a toujours généré l'intérêt et la préoccupation pour les organismes de réglementation depuis que le conservatisme politique a réduit le coût imposé par les normalisateurs et les autorités de réglementation ainsi. Pris ensemble,

Watts (2003a) soutient que les deux types de conservatisme sont susceptibles d'améliorer l'efficacité de contrats parce qu'ils représentent des cautionnements des agents (Basu, 2005). En revanche, Ball et Shivakumar (2005) font valoir que le conservatisme inconditionnel ne peut pas augmenter la dette et l'efficacité de contrats de la gouvernance, car il ne provoque pas d'états financiers d'intégrer toute l'information qui était inconnue au moment du contrat. Toutefois, la perte de reconnaissance à temps, conditionnelle à un engagement ferme des pertes économiques, provoque les gestionnaires d'agir sur les pertes plus rapidement. Ils concluent que le conservatisme inconditionnel semble inefficace ou, au mieux dire, neutre dans la passation des marchés.

En outre, les preuves historiques suggèrent que la plupart des formes de conservatisme inconditionnel sont nées des réglementations fiscales et des mesures incitatives. Par exemple, l'une des principales raisons d'adopter LIFO et les méthodes d'amortissement conservatives est de réduire au minimum l'impôt sur le revenu de l'entreprise. Toutefois, quel que soit le rôle de l'efficacité dans la passation des marchés, les deux types de conservatisme capturent des investisseurs et d'autres fonctions asymétriques de pertes, en réduisant au minimum les entreprises contentieux, la fiscalité, ou les coûts de la réglementation et, enfin, pourrait fournir des avantages à tous les utilisateurs de la comptabilité (Beaver et Ryan 2005).

Le conservatisme est une propriété importante du revenu. Ball et Shivakumar (2006) font valoir que le conservatisme conditionnel (l'asymétrie) est un déterminant important de la qualité des gains, de l'amélioration de l'utilité des états financiers en général, et plus spécifiquement dans le contexte de la gouvernance d'entreprise, de la gestion de compensation et de la dette. Les différences dans la demande de la comptabilité des revenus dans les différents contextes politiques, toutefois, c'est la cause de la propriété du conservatisme de varier à l'échelle internationale. Ball et al. (2000) ont examiné la différence entre le conservatisme dans les pays de „common law” (par exemple, États-Unis, Royaume-Uni) et les pays du code de droit (par exemple, Allemagne, Japon). Ils font valoir que la loi dans les pays du code du droit, la forte influence politique sur la comptabilité conduit la demande pour le revenu comptable influencée par les préférences de paiement de la main-d'œuvre, du capital et le gouvernement. Pourtant dans les pays de „common law”, le modèle de gouvernance de l'„actionnaire” détermine le rôle important joué par la divulgation publique du marché dans les propriétés de la comptabilité des revenus. Ils trouvent que le revenu dans les pays de „common law” incorpore les pertes économiques plus rapidement (conservatisme revenus) que dans les pays du code de droit.

Dans une autre étude par Ball et al. (2003), les auteurs font valoir que le classement des pays par les normes comptables n'est pas appropriée parce que la pratique de rapports financiers dans le cadre d'un ensemble donné de normes sont sensibles aux incitations des dirigeants et des auditeurs chargés de la préparation et de la vérification des états financiers. Ils montrent que, bien que les normes comptables dans les pays d'Asie de l'Est, y compris Hong Kong, la Malaisie, Singapour et Thaïlande, proviennent de pays de „common law” (Royaume-Uni, États-Unis et International Accounting Standards (IAS)), leurs rapports financiers ne sont plus conservateurs (par exemple, la reconnaissance en temps voulu des pertes économiques) que ceux relevant du code de droit.

### **3. La qualité de l'audit et le conservatisme comptable**

Les auditeurs jouent un rôle important dans la détermination de la qualité des déclarations des gains financiers. Les études précédentes suggèrent le fait que l'une des raisons pour le conservatisme comptable est l'exposition des auditeurs en justice. Kothari et al. (1988) affirme que la responsabilité juridique des auditeurs et des gestionnaires a augmenté de façon significative au cours des trois dernières décennies. Le conservatisme réduit la responsabilité des auditeurs et a comme conséquence la croissance de la rapidité asymétrique des gains en reconnaissant les pertes économiques. Basu (1997) et Basu et al. (2001a) ont constaté que concernant les gains la reconnaissance des mauvaises nouvelles dans les périodes de forte exposition de la responsabilité de l'auditeur est plus rapide, en accord avec le fait que les auditeurs sont plus conservateurs lorsqu'ils sont exposés à une grande responsabilité juridique.

DeAngelo (1981b) fait valoir que la taille d'audit de la firme pourrait être un substitut de la qualité de l'audit. Ainsi, les grands cabinets d'audit sont censés de fournir des gains de haute qualité dans les états financiers. En accord avec cet argument, Basu et al. (2001b) montrent que les revenus rapportés par les grandes cabinets d'audit sont plus conservateurs que les revenus des petits cabinets

### **4. Le rôle du conservatisme**

Les conflits d'intérêts entre les gestionnaires et les autres parties de l'entreprise viennent du fait que les gestionnaires sont efficacement dans le contrôle des avoirs des entreprises, mais ils n'ont pas généralement des participations importantes dans leur entreprise (Berle et Means, 1932; Jensen et Meckling, 1976). Ces conflits ne peuvent pas être complètement résolus dans le cadre de contrats parce qu'il est coûteux, parfois impossible, d'écrire et de faire respecter les contrats complètement (Fama et Jensen, 1983; Hart, 1995). Ainsi, dans un monde avec des contrats incomplets, les mécanismes de gouvernance d'entreprise ont le rôle d'atténuer ces conflits.

Comme dans la pratique, il existe un certain nombre de mécanismes de gouvernance (telles que les conseils d'administration, les actionnaires institutionnels, les marchés de produits, le contrôle du marché des entreprises, l'ensemble des lois qui régissent les entreprises, etc) on met l'accent sur le conseil d'administration parce qu'il est l'un des principaux mécanismes de gouvernance qui surveille directement les gestionnaires.

Les conseils ratifient et surveillent les décisions des cadres supérieurs parce qu'il est efficace de distinguer l'initiation de la décision et la mise en œuvre de la ratification et la surveillance de la décision (Fama et Jensen, 1983). Pour remplir ce rôle, ils reçoivent le pouvoir d'embaucher et de licencier les directeurs, les gestionnaires, de déterminer l'indemnisation et d'approuver les décisions importantes telles que l'acceptation de grands projets d'investissement (Grinstein et Tolkowsky, 2004). Ses membres ont besoin d'informations vérifiables afin de surveiller efficacement l'entreprise. En pratique, les informations reçues par le conseil d'administration sont souvent fournies par la direction qui prend une incitation favorable à l'information. Watts (2003) fait valoir que le conservatisme a évolué comme un moyen de compenser ce biais. Plus précisément, le conservatisme joue au moins trois rôles potentiels dans la gouvernance

d'entreprise. Tout d'abord, la comptabilité conservatoire empêche la surestimation des bénéfices cumulatifs et de l'actif net. Watts (2003) soutient que cette limite des gestionnaires opportunistes de paiements empêche la compensation. C'est très important parce que la récupération de l'excédent de l'indemnisation est difficile et la responsabilité est limitée. Ce rôle de conservatisme attribué au gestion pour limiter l'indemnisation est similaire au conservatisme dans le rôle de la prévention de trop-perçu de dividendes aux actionnaires au détriment des obligations, aspect qui est discuté en Watts et Zimmerman (1986) et Holthausen et Watts (2001), et dans les recherches d'Ahmed et al. (2002).

Deuxièmement, Ball (2001) fait valoir que, sans les comptes conservateurs les gestionnaires sont incités à continuer de saisir la valeur actualisée nette négative pour les investissements dans le but d'éviter les pertes sur les rapports de la vente ou de l'abandon. En outre, Watts (2003) suggère que par l'accélération de la reconnaissance de la perte, le conservatisme fournit au conseil un signal d'enquêter les raisons des pertes. Ces enquêtes peuvent conduire à la résiliation des projets ou encore au licenciement des managers.

Les arguments ci-dessus impliquent que le conservatisme est un outil pour les administrateurs à s'acquitter de leur rôle de la ratification et de suivre les décisions clé. Ainsi, un fort conseil exigerait la comptabilité conservatrice. D'autre part, les conseils qui sont dominés par des initiés ou des conseils de surveillance à la faiblesse des incitations sont susceptibles de fournir aux gestionnaires une plus grande possibilité d'utiliser une comptabilité agressive (ou moins conservatrice). En résumé, en vertu de ce point de vue, la force du conseil d'administration sera associée positivement avec le conservatisme de la comptabilité.

Bien que la recherche sur le conservatisme est en plein essor, le manque d'une mesure du conservatisme spécifique d'une entreprise avant dans la littérature a limité la nature des tests- hypothèses qui peuvent être menés. Pour cette raison, Khan et Watts (2007) ont construit la C-Score, une mesure du degré de conservatisme de l'entreprise et ont développé des hypothèses sur le conservatisme de gains. Ils trouvent que les jeunes entreprises, entreprises avec plus de cycles d'investissement et les entreprises avec une incertitude plus idiosyncrasique sont plus conservatrices. Khan et Watts (2007) justifient ces conclusions par la réponse que les jeunes entreprises sont moins matures et moins stables et ont plus des problèmes de l'asymétrie de l'information. Par conséquent, les jeunes entreprises sont pressées d'être plus conservatrices. En ce qui concerne les entreprises avec plus de cycles d'investissement, ils ont tendance à avoir moins de revenus variables et d'être plus susceptibles de faire face à de mauvais résultats dans le domaine d'investissements que les entreprises avec des cycles courts d'investissement. Ainsi ces entreprises ont la tendance de faire leur (potentiels) actionnaires souffrir des pertes. Par conséquent, ces entreprises ont une plus grande demande des marchés pour le conservatisme. Enfin, les entreprises avec des incertitudes plus idiosyncrasiques (mesuré par l'écart-type des rendements boursiers quotidiens) ont un plus haut degré de comptabilité conservatrice parce que les coûts sont de plus en plus élevés comme les risques idiosyncratiques.

Plusieurs articles récents examinent si le conservatisme est en corrélation avec la structure du capital social et si le conservatisme permet de réduire l'asymétrie de l'information. Ahmed et Duellman (2007) constatent que la comptabilité conservatrice est pratiquée pour aider les administrateurs à réduire

les coûts des entreprises. Plus précisément, leurs résultats montrent que le pourcentage des administrateurs de l'intérieur (à l'extérieur) est négativement (positivement) lié au conservatisme. En se concentrant sur des questions de gestion de propriété, Lafond et Roychowdhury (2008) expliquent que la diminution de la gestion de propriété donne lieu à plus de problèmes et, par conséquent, la recherche empirique du conservatisme avec la baisse de la gestion de la propriété implique que la demande pour une comptabilité conservatrice comptables peut être liée à la nécessité des actionnaires des entreprises. En outre, après le contrôle des demandes de conservatisme, Lafond et Watts (2008) affirment que le conservatisme a le but de réduire l'asymétrie de l'information. Des diverses mesures de conservatisme comptable ont été utilisées dans la littérature, par exemple Basu qui a utilisé le modèle fondé sur „accrual-based measure” et „market-to-book ratio”.

Comprenant la notion de Basu (1997) et d'autres variables qui influent sur le conservatisme (taille, le marché de livre et de levier), Khan et Watts (2007) ont construit une mesure spécifique de la comptabilité conservatrice qui est nommé le C-Score. On utilise ces mesures pour examiner la relation entre le conservatisme et la comptabilité de la gouvernance des entreprises.

## **10. Conclusions**

On peut conclure que le conservatisme est potentiellement utile dans la gouvernance d'entreprise pour au moins trois raisons. Tout d'abord, le conservatisme réduit le risque de sur-compensation de la gestion par une surestimation possible de l'actif et des revenus. Deuxièmement, le conservatisme permet aux administrateurs d'identifier plus facilement la valeur actualisée nette négative des projets et de prendre des mesures correctives visant à limiter les pertes. Troisièmement, le conservatisme des gestionnaires réduit les incitations ex ante pour une valeur actuelle nette négative des projets. Ces arguments suggèrent que le conservatisme sera positivement relié à la force du conseil et aux mesures incitatives.

L'étude du lien entre la gestion de propriété et de conservatisme trouve que les entreprises avec moins de gestion de propriété rapportent plus des revenus conservatifs. Les résultats sont compatibles avec l'équité partie prenantes exigeant un plus grand conservatisme comme un moyen d'attaquer les problèmes découlant d'une plus grande séparation entre la propriété et le contrôle. Plus précisément, les gestionnaires bénéficient effectivement de la responsabilité limitée en ce qui concerne d'autres parties prenantes dans l'entreprise. Le conservatisme se pose comme un mécanisme potentiel à l'adresse des problèmes découlant de la responsabilité limitée et des horizons limités. Dans le cas de la baisse de la gestion de propriété, la gravité de l'agence problème augmente ce qui conduit à l'augmentation de la demande de conservatisme. Le conservatisme de la comptabilité produit des gains qui reflètent les mauvaises nouvelles plus rapidement que les bonnes nouvelles.

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## IMPACT OF COMESA ON AGRICULTURAL TRADE AND FOOD SECURITY IN SUDAN

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**Abstract.** This paper aimed at quantifying the impact of the COMESA on agricultural trade and food security in Sudan. A multi-market, multi-regional model is applied. Three scenarios were simulated ranging from zero tariffs to full policy liberalization. Impacts of these scenarios on production, consumption, trade, welfare, and national food security were measured. The simulation results show that the zero tariffs application by Sudan under COMESA has led to negative impacts on production, trade and food security. The study covered commodities depicted negative change in terms of quantity and value; this attributed to the negative supply response under distorted market. However, application of zero tariffs under COMESA region expected to reproduce positive impact in the short to medium run if Sudan improve its competitiveness by removing domestic distortion and therefore increase its ability to compete with commodities from other COMESA countries. The study concluded that the government policies of COMESA member countries, especially Sudan, should put more emphasis to expand investment in agriculture and encourage integrating their markets regionally to benefit from potential of trade and comparative advantage existing in the region.

**JEL Classification:** Q17, Q18

**Keywords:** COMESA, agricultural trade, food security, Sudan

### 1. Introduction

The preferential trade agreement (PTA) for eastern and southern African states is initiated as the result of the first extraordinary conference of Ministers of Trade, Finance and Planning held in Lusaka, Republic of Zambia in March 1978. Second extraordinary session of Heads of States of the Organization of African Unity, held at Lagos in April, 1980, decided that an African common market should be established by the year 2000. The PTA treaty was signed in December 1981, implemented in 1983, by 22 countries; the treaty establishing Common Market for

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Eastern and Southern Africa countries (COMESA) was signed on November 5, 1993 in Kampala, Uganda and was ratified one year later in Lilongwe, Malawi on December 8, 1994 (COMESA 2004). Now, COMESA is at the stage of free trade area where zero tariffs are applied. COMESA planning for the future is to convert free trade area into a customs union. Agriculture is considered to be the engine for economic development in Sudan. The sector accounts for more than 40 per cent of Sudan's gross domestic product (GDP), provides a livelihood to about 70 per cent of labor force, accounts for about 90 per cent of foreign exchange earnings from non-oil exports, and provides raw materials to the industrial sector (Abdel Karim et al 2007).

The agricultural exports constitute the bulk of total intra-COMESA exports of Sudan as its share, on average, is about 63.4 percent during 2001-2007. The agricultural exports showed an increasing trend as it reached US \$ 90.5 million in 2006 compared to US \$ 26.7 million in 2001 (Table 1). Cotton was the leading agricultural export commodity to COMESA countries followed by sesame and lives animals and seed cake, while skins, groundnuts and meat contributed the smallest shares (Table 2). Considering the direction of Sudan exports to COMESA countries, Egypt absorbed the most exports of Sudan followed by Ethiopia and Kenya (Appendix 1). On the other hand, main import suppliers for Sudan are Egypt, Kenya, Zimbabwe and Uganda (Appendix 2). Egypt is considered the main trade partner of Sudan in the COMESA region.

Table 1. Agricultural exports of Sudan to COMESA countries, (2001 – 2007)

Year	Total Export to COMESA US\$ (000)	Agricultural exports US\$ (000)	Share in total intra-COMESA (%)
2001	44492.1	26772.0	59.5
2002	70301.0	53014.0	75.4
2003	55734.4	34525.0	61.9
2004	114336.9	93459.0	81.7
2005	138549.0	72599.6	52.4
2006	150128.0	90527.1	60.3
2007	86796.0	47390.6	54.6
<i>Average</i>	<i>94333.9</i>	<i>59755.3</i>	<i>63.4</i>

Source: Bank of Sudan, Annual Statistical Brief.

Table 2. Share of agriculture commodities in total Sudan's intra- COMESA trade, 2001 – 2007 (percent)

Year	Cotton	Sesame	Gum Arabic	Ground-nut	Seed Cake	Live animal	Skins	Meat
2001	22.6	31.4	0.10	-	1.48	3.53	0.29	0.04
2002	30.7	19.1	0.05	0.04	0.86	14.44	0.10	0.00
2003	21.0	16.3	1.01	0.14	4.06	18.96	0.63	-
2004	28.4	37.9	0.02	0.3	1.35	11.87	1.82	0.03
2005	22.8	18.3	0.0	0.0	0.0	9.1	1.2	0.9
2006	22.2	25.6	0.0	0.0	0.0	11.7	0.5	0.0
2007	24.5	15.4	-	0.0	0.7	12.3	1.4	-

Source: Bank of Sudan, Annual Statistical Brief

Trade in agricultural products serves three functions. First, trade can contribute to stabilizing supply when national fluctuations in production are greater

than the fluctuations in the region. Thus, free intra-regional trade among the COMESA countries could be an efficient substitute for national stockpiling and might be used to even-out fluctuations in national production. Johnson (1978, 1981) shows that worldwide free trade grains would drastically reduce the need for holding carryover stocks, because fluctuations in world cereal production are minimal compared to fluctuations in national production. The same may hold true if variability in production in individual member countries is greater than variability in production for the COMESA region as whole. However, if production in all countries were perfectly correlated, intra-regional trade could not help stabilize consumption. Second, trade in agricultural products may partly substitute for working stocks if the harvesting calendar differs somewhat among trading partners. Third, trade may allow countries to specialize in production in accordance with comparative advantage. Thus, trade would help to increase national income and improve food security.

Given the importance of agricultural sector in Sudan economy, joining the intra-regional trade arrangement such as COMESA could have great impact on both agricultural trade and food security of the country. The objective of this paper is to investigate the impacts of COMESA trade liberalization on agricultural production, consumption, trade, government budget, food security and welfare of the country. We analyzed and quantified the impacts of the COMESA on Sudan's agricultural trade and food security under different policy scenarios by applying a multi-market, multi-regional model. The model included three countries specifically Sudan, Egypt, Kenya and the rest of the World. Egypt and Kenya were selected because they are the main trade partner of Sudan in the COMESA region.

## **2. Methodology**

A multi-market, multi-regional model is developed for analyzing the implications of the COMESA on Sudan's agricultural trade and food security. Multi-market models have in recent years become one of the most widely used tools for the analysis of policies and shocks (see e.g. Goldin and Knudsen, 1990; Dixit et al., 1992; Hartmann et al., 1994; Abdel Karim, 2002) or to measure liberalization effects of agricultural trade on both developed and developing countries (Kirschke et al., 1996). The model is a standard static model that assumes perfectly competitive markets, homogeneity of the products and the small country case. The model has been implemented and solved using Excel. The model embodies different important characteristics of the agriculture in Sudan like substitution effects (substitution between cotton, groundnuts, wheat and sorghum in irrigated sector and between sesame and sorghum in rain-fed areas). In addition, some national food security indicators like the self-sufficiency ratio, per capita consumption, and the ratio of total exports to food imports have been incorporated in the model to provide an overview of national food security implication of any policy shock.

The supply and demand system in the model is derived from a reduced form Cobb-Douglas function (Kirschke *et al.*, 1996; Jechlitschka, et al 2007). The derived demand equation for products used as intermediate inputs is captured by input-output coefficients. In specifying supply and demand functions for each product, domestic prices for one market help to determine the quantity supplied and demanded not only in that market but also in the other market through cross-market price linkages captured by a set of own price elasticities and cross price

elasticities (see Von Lampe, 2000). The parameters of the supply and demand equations are calibrated so as to reproduce the base year (average, 2000-2002).

### Supply and Demand System

Supply (production) quantity of a commodity is set to depend on its own price and the prices of competing products. A supply function can be specified as follows:

$$q_i^s = c_i \cdot (p_i^s)^{\epsilon_{ii}} \cdot \prod (p_j^s)^{\epsilon_{ij}}, \quad i = 1, \dots, 9 \quad (1)$$

Where  $q_i^s$  represents the quantity supplied of product  $i$ ,  $p_i^s$  represents the own price of the product  $i$ ,  $p_j^s$  is the price of a competing product  $j$ . The term  $c_i$  is a constant term. The exponential terms  $\epsilon_{ii}$  and  $\epsilon_{ij}$  are the own supply price elasticity of product  $i$  and the cross price elasticity of products  $i$  to product  $j$ , respectively.

Demand (consumption) quantity of a commodity is set to depend on its own price, the prices of the close consumption substitutes and consumer per capita income. The demand function is expressed by the following equation (see e.g. Kirschner *et al.*, 1985, and Koester, 1992; Abdel Karim, 2002):

$$q_i^d = k_i \cdot (p_i^c)^{\eta_{ii}} \cdot \prod (p_j^c)^{\eta_{ij}} \cdot y_i^{\alpha_i}, \quad i = 1, \dots, 9 \quad (2)$$

Where  $q_i^d$  is the quantity demanded of product  $i$ ,  $p_i^c$  represents the own product consumer price,  $p_j^c$  is the price of competing product  $j$ ,  $k_i$  is the constant term, while  $\eta_{ii}$ ,  $\eta_{ij}$  and  $\alpha_i$  are the own demand price elasticity of product  $i$ , the cross price elasticity of products  $i$  and  $j$  and the income elasticity of product  $i$ , respectively.

### Price Relationships

In most trade models used to quantify the effects of agricultural trade liberalization support policies are introduced exogenously in the price linkage equation. This approach usually involves both, the use of a price wedge defining the absolute difference between domestic and international price levels and response parameter (transmission elasticity) indicating the connection between domestic and world market movements. With the assumption that there are no trade restrictions on the commodities covered by the model, the domestic price of a commodity is assumed to vary in the same direction and to the same degree of world market price (i.e. the response coefficient is equal to one). This representation of the price-linkage equations assumes a strong connection between movements in the world and domestic prices. Taking into account taxation or subsidization the price relation is represented by the following equations ((Braveman and Hammer, 1986; Abdel Karim, 2002) :

$$p_i^d = p_i^w (1 + r_i), \quad i = 1, \dots, 9 \quad (3)$$

$$p_i^s = p_i^d (1 - t_i^p), \quad i = 1, \dots, 9 \quad (4)$$

$$p_i^c = p_i^d (1 + t_i^c), \quad i = 1, \dots, 9 \quad (5)$$

By substituting equation 3 in equation 4 and 5 gives

$$p_i^e = p_i^w (1 + r_i) \cdot (1 - t_i^p), \quad i = 1, \dots, 9 \quad (6)$$

$$p_i^c = p_i^w (1 + r_i) \cdot (1 - t_i^c), \quad i = 1, \dots, 9 \quad (7)$$

Where,  $p_i^d$  and  $p_i^w$  are domestic and world market price, respectively.  $p_i^e$  is the producer price for export and import-substitute crops.  $p_i^c$  is the consumer price.  $r_i$  is the protection rate on export and import-substitute commodities. When  $r_i$  is less than zero this means that policy leads to taxation of producers, and an  $r_i$  greater than zero means subsidization of producers.  $t_i^p$ ,  $t_i^c$  are the domestic rates of taxation of producers and consumers respectively.

### Welfare Analysis

The concept of consumer and producer surplus has been employed to evaluate the sign and magnitude of welfare effects associated with policy changes (see Loo and Tower, 1990; Jechlitschka, 1997). Gain and losses to producers from price changes are measured as changes in producer surplus. Likewise, consumer gain or losses can be measured as changes in consumer surplus.

Producer surplus equals gross revenue minus total variable cost. Producer surplus is represented by:

$$PS_i(p_i^e) = R_i(p_i^e) - C_i(p_i^e), \quad i = 1, \dots, 9 \quad (8)$$

Where,

$$R_i(p_i^e) = p_i^e \cdot q_i^e, \quad i = 1, \dots, 9$$

And

$$C_i(p_i^e) = p_i^e \cdot q_i^e - \int_0^{p_i^e} q_i^e(p) dp$$

Where,  $PS_i$  is producer surplus, the terms  $R_i$  and  $C_i$  are producer revenue and variable cost, respectively. On the other, consumer surplus can be measured by the difference between marginal utility, which indicates the maximum price which consumers would be willing to pay for that unit, and the price actually paid (the market price); this represents consumer welfare (Sadoulet *et al.*, 1995). By applying this desired definition consumer surplus is measured as follows:

$$CS_i(p_i^c) = B_i(p_i^c) - E_i(p_i^c), \quad i = 1, \dots, 9 \quad (9)$$

$$E_i(p_i^c) = p_i^c \cdot q_i^d, \quad i = 1, \dots, 9$$

$$B_i(p_i^c) = p_i^c \cdot q_i^d + \int_{p_i^c}^u q_i^d(p) dp$$

Where,  $CS_i$  is consumer surplus, the terms  $B_i$  and E benefit and expenditure, respectively, u is the maximum price. The government budget generated in the model is measured by the following equation:

$$GB_i = q_i^s (p_i^w - p_i^s) + q_i^d (p_i^c - p_i^w), \quad i = 1, \dots, 9 \quad (10)$$

Where,  $GB_i$  is the government budget.

Finally, the net welfare is derived by the sum of producer surplus, consumer surplus and government budget.

$$W_i = PS_i + CS_i + GB_i, \quad i = 1, \dots, 9 \quad (11)$$

Where,  $W$  is the welfare.

### Food Security Indicators

In order to assess the implication of COMESA on national food security in Sudan, the paper focused on the three issues of food security: First, food availability issue which is measured by the self-sufficiency ratio of cereals, livestock and sugar. Self-sufficiency ratio is measured by the ratio of domestic supply to domestic demand (equation 12). Second, per capita consumption of food products which is measured by the calculation of per capita consumption (kg/head) of cereals, livestock and sugar. The per capita consumption is measured by the ratio of domestic demand to the total population (equation 13). Third, ability of the economy to finance its food imports out of total export revenues which is measured by the ratio of total exports to food imports (equation 14). The three indicators are well known in the measurement of food security (see Goldin *et al.*, 1993 and Abdel Karim, 2002).

$$SSR_i = \frac{q_i^s}{q_i^d}, \quad i = 1, \dots, 3 \quad (12)$$

$$PPC_i = \frac{q_i^d}{N}, \quad i = 1, \dots, 3 \quad (13)$$

$$RTF = \frac{TE}{TIF}, \quad (14)$$

Where, SSR is the self-sufficiency ratio, PCC is the per capita consumption and RTF is the ratio of total exports to food imports.

### 3. Scenarios

With the aid of the modeling approach, the following policy scenarios are simulated to address the specific objectives of the paper, mainly to investigate the

impacts of COMESA trade liberalization on Sudan's agricultural production and food security:

#### **Baseline Scenario (B)**

The baseline scenario replicates production, consumption and policy conditions prevailed in the base period (average of 2000 to 2002). B is used as a reference for the subsequent simulated scenarios.

#### **COMESA Zero Tariff Scenario (S1)**

As Sudan applied zero tariffs rate under the agreement of COMESA free trade area, this scenario is intend to simulate the impact of removing border taxes (tariffs) from products coming from COMESA trading partners.

#### **Partial Policy Reform Scenario (S2)**

In this scenario, the impact of S1 is simulated under a partial domestic policy reform where producer taxes are removed while keeping other forms of taxes.

#### **Full Policy Reform Scenario (S3)**

This scenario combines S1 with full liberalization of domestic market which is done by equating domestic prices with the world market prices of the covered commodities.

### **4. Results and Discussions**

#### **Production and Consumption Effects**

Production and consumption impacts of the simulated scenarios S1, S2 and S3 are presented in Table (3). The application of zero tariff resulted in a lower domestic prices and reduction in protection provided by border tax. The results of negative changes in domestic prices in S1 resulted in negative changes in supply quantities of the covered commodities. However, under policy liberalization scenarios (S2 and S3) the situation was reversed as they led to an increase in supply quantities of the covered commodities for example the supply of gum Arabic, sesame, groundnuts and sunflower increased by 3.2 percent, 7.2 percent, 8.5 percent and 68.9 percent, respectively, relative to the base period. By contrast some commodities showed a decline in supply quantities for example sugar and wheat domestic supply decreased by 9.9 percent and 4.4 percent, respectively, relative to the base period. This could be attributed to the decrease of domestic producer prices of these commodities due to removal of indirect subsidy under liberalization scenarios compared to the base period.

On the demand side, the domestic consumption of the covered commodities was increased due to declines in the domestic prices as the result of applying zero tariffs under S1. Demand quantities of sugar showed the highest increase of 13.4 percent, followed by cotton and sheep by 6.7 percent and 4.1 percent respectively relative to the base period. The impact on demand coming from S2 is analogous to that of S1 where the same pattern of increase is observed. The abolition of domestic consumer tax under S3 resulted in an increase in demand quantities of the covered commodities at a higher rate compared to that of S1 and S2, for example cotton demand increased by 6.8 percent in S2 and by 20.8

percent in S3, sesame demand increased by 2.0 percent in S2 and by 5.2 percent in S3, and sheep demand increased by 4.2 percent in S2 and 12.4 percent in S3.

Table 3. Changes in supply and demand quantities for Sudan agricultural commodities in S1, compared to S2 and S3 percentage change relative to the base period

Market	Production and Consumption					
	S1		S2		S3	
	Prod.	Cons.	Prod.	Cons.	Prod.	Cons.
Cotton	-5.4	6.7	-3.2	6.8	-3.2	20.8
GumArabic	-1.8	1.8	3.2	2.1	3.2	2.1
Sesame	-2.3	1.5	7.2	2.0	7.3	5.2
Sorghum	0.2	1.7	-3.6	1.7	-3.8	-8.3
Sheep	-2.0	4.1	0.4	4.2	0.5	12.4
G. nuts	-0.7	1.3	8.5	1.3	8.5	3.7
Sugar	-5.4	13.3	-9.9	13.3	-9.9	3.3
Sunflower	-8.3	-0.2	68.9	-0.2	68.9	-0.5
Wheat	-0.4	1.3	-4.4	1.4	-4.4	1.7

Source: Authors own calculation

### Trade Effects

The trade effects for the agricultural commodities of the simulated scenarios S1, S2 and S3 are presented in Table (4). If we consider impacts of S1, the export quantity and value is expected to significantly reduce in response to the reduction of domestic production e.g. the export quantities of sheep, sorghum and sugar decreased by 97.4 percent, 90.9 percent, and 56.9 percent, respectively, compared to the base period. On the import side, however, wheat import quantities increased by 1.8 percent, because of the decrease in domestic supply and increase in domestic demand.

The negative trade effect under S1 is almost recovered under S2, where the removal of producer taxes has led to an increase in domestic supply. For example, the export quantities of sunflowers increased by 119.5 percent compared to the base period. On the import side, however, wheat import quantities increased by 3.0 percent due to lower domestic supply.

The situation is even better if we consider the trade effects under S3, where S1 is simulated under full liberalization domestic policy. The removal of domestic distortion has led to an improvement of competitiveness of the covered commodities and therefore their ability to compete with commodities from other COMESA countries.

Table 4. Trade effects for Sudan agricultural commodities in S1, compared to S2 and S3, percentage change relative to the base period

Market	Trade Effects					
	S1		S2		S3	
	Export quantity	Export Value	Export quantity	Export Value	Export quantity	Export Value
Cotton	-6.1	-6.1	-3.8	-3.9	-4.7	-4.8
Gum Arabic	-1.8	0.4	3.2	4.8	3.2	4.8
Sesame	-4.7	-3.8	10.6	8.5	8.7	6.8
Sorghum	-90.9	-90.8	-336.0	-337.0	279.8	277.4
Sheep	-97.4	-97.4	-58.7	-58.5	-186.6	-187.7
G. nuts	-146.1	-146.4	529.7	522.4	359.2	354.6
Sugar	-56.9	-56.8	-73.6	-73.5	-46.3	-46.2
Sunflower	-14.3	-10.7	119.1	127.7	119.2	127.8
Wheat*	1.8	2.0	2.9	3.0	3.4	3.5

Source: Authors own calculation

\* Imported commodity

### Welfare Effects

The welfare effects for the producers and consumers implied by the simulated scenarios S1, S2 and S3 are presented in Table (5). Producers of all agricultural commodities covered by the model experienced losses in welfare in S1 due to lower domestic prices. The highest welfare losses are noticed for the producers of sugar, sheep and groundnuts. On the consumer side, there is a small welfare gain due to decrease in consumer prices.

If we consider the welfare impacts of the removal of border tariffs plus abolishing domestic producer taxes in S2, the producers of the most agricultural commodities covered by the model experienced welfare gain, except cotton, sugar and wheat producers. The consumer surplus effects are similar to that of S1.

The welfare impacts of S3 as shown in Table (5), the consumers of all agricultural commodities covered by the model experienced welfare gain more than in S1 due to removal of consumer taxes for example consumers of sheep and groundnuts expected to gain US\$ 23.6 million and US\$ 14.0 million, respectively. For the producers their welfare gains are not much different from that of S2.

Table 5. Welfare effects for Sudan in S1, compared to S2 and S3 absolute change relative to the base period

Market	Welfare					
	S1		S2		S3	
	Producer surplus (mUS\$)	Consumer surplus (mUS\$)	Producer Surplus (mUS\$)	Consumer surplus (mUS\$)	Producer Surplus (mUS\$)	Consumer surplus (mUS\$)
Cotton	-6.0	0.01	-0.3	0.01	-0.3	0.02
GumArabic	-0.3	0.0	0.5	0.0	0.5	0.0
Sesame	-14.2	0.8	52.5	1.0	52.8	2.4
Sorghum	-16.1	0.8	4.9	0.8	0.8	-4.6
Sheep	-111.3	8.8	24.5	9.0	32.0	23.6
G. nuts	-32.5	5.3	212.4	5.9	213.4	14.0
Sugar	-203.0	2.9	-312.9	2.3	-312.9	0.7
Sunflower	-0.2	0.01	2.7	0.013	-3.8	0.3
Wheat	-2.3	0.3	-3.8	0.3	2.7	0.04

Source: Authors own calculation

### Food Security Effects

The impact on national food security measured by SSR, PCC and RTF indicators implied by the simulated scenarios S1, S2 and S3 are presented in Table (6). The food security status of the country in S1 is worsened. This deterioration is indicated by the negative changes of the self-sufficiency ratios of cereals, livestock (sheep), sugar and oilseeds which were dropped by 29.2 percent, 5.8 percent, 16.5 percent and 2.5 percent, respectively, compared to the base period. Consequently the aggregated self-sufficiency ratio decreased by 5.3 percent, this could be attributed to the decrease in the supply of food commodities, in addition to the increase in their domestic demand. Per capita consumption for the modeled food commodities substantially improved compared to the base period. As can be seen per capita consumption of sugar and livestock increased to 13.3 percent and 4.1 percent, respectively, and at aggregate improved by 3.8 percent compared to the base period. This could be attributed to the lower consumer prices which compensate the negative effect of lower per capita income. The ability of Sudan to import its essential food commodities, as indicated by RTF, is decreased by 41.3 percent.

In case of S2 the food security status of the country is also worsened likewise in the previous scenario except the improvement in the oilseeds self-sufficiency (increased by 7.6 percent). This deterioration is indicated by the negative changes of the self-sufficiency ratios of cereals, sugar and livestock which were dropped by 31.8 percent, 20.6 percent, and 3.6 percent, respectively, compared to the base period. However, per capita consumption as a prime important indicator for food security is substantially improved for sugar, sheep and cereals by 13.4 percent, 4.2 percent and 1.6 percent, respectively, compared to their base values. The ability of the country to import its essential food commodities (RTF) is improved when compared to the S1 results as the ratio of total exports to food imports is declined by 19.5 percent under S2 compared to 41.3 percent declined under S1.

In case of S3 the food security status of the country is slightly improved with a varying degree compared to the S2. For example, SSR of cereals and sugar decreased by 26.9 percent and 12.9 percent compared to a reduction of 31.9

percent and 20.6 percent in S2. The ability of the country to import its essential food commodities is further deteriorated. The ratio of total exports to food imports is declined by 25.7 percent in this full policy reform scenario (S3) compared to 19.5 percent in S2.

Table 6. National food security effects for Sudan in S1 compared to S2 and S3, indicators change relative to the base period

		Base value	Scenario value (S1)	Change (%)	Scenario value (S2)	Change (%)	Scenario value (S3)	Change (%)
Self sufficiency	Cereal	1.100	0.779	-29.2	0.749	-31.9	0.804	-26.9
	Livestock	1.064	1.002	-5.8	1.025	-3.6	0.951	-10.6
	Sugar	1.367	1.139	-16.6	1.085	-20.6	1.190	-12.9
	Oilseeds	1.188	1.159	-2.5	1.278	7.6	1.249	5.1
	Aggregate	1.021	0.967	-5.3	0.990	-3.6	0.946	-7.8
Per caput cons	Cereal	0.124	0.126	1.6	0.126	1.6	0.117	-5.4
	Livestock	0.521	0.542	4.1	0.543	4.2	0.586	12.4
	Sugar	0.019	0.022	13.3	0.017	13.4	0.015	3.4
	Oilseeds	0.033	0.033	1.3	0.033	1.4	0.034	3.8
	Aggregate	0.697	0.723	3.8	0.718	3.8	0.752	8.6
Ratio of total export to the total food imports		0.970	0.474	-41.3	0.781	-19.5	0.720	-25.7

Source: authors own calculation

## 5. Conclusions

There is a great potential for intra-regional trade, especially in agricultural products, between COMESA member countries and food insecurity problem is expected to be solved and food supplies to be stabilized by trade flows between the member countries. Also, trade is expected to increase the income which will indirectly make easy access to food as one of the causes of food insecurity (no access). Potential benefits are not easy to capture, success depends on the willingness of countries to implement intra-regional trade and ability to redirect production and trade according to the comparative advantage.

The empirical result of zero tariffs application by Sudan under COMESA has led to negative impacts on production, trade and food security. The covered commodities depicted negative change in terms of quantity and value; this is due to the negative supply response under distorted market. However, application of zero tariffs under COMESA region expected to reproduce positive impact in the short to medium run if Sudan improve its competitiveness by removing domestic distortion and therefore increase its ability to compete with commodities from other COMESA countries. The paper concluded that Sudan in order to benefit from the potential of intraregional trade should reorient its policies in agricultural sector through reducing all forms of taxes both direct and indirect and adopting policies to enhance efficient allocation of resources and export promotion e.g. motivating

production of export commodities, better quality standards and investment in research and infrastructure.

As a general conclusion, the government policies of COMESA member countries, especially of Sudan, should encourage integrating their markets regionally to benefit from existing potential of trade and comparative advantage in the region. Fortunately the recent agreement between COMESA member countries to form a common external tariff and to proceed towards common market by the end of 2008, the intra-COMESA trade is expected to be increased substantially.

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Appendix 1. Direction of Sudan intra-COMESA exports, 2001-2007 (percent).

Country	2001	2002	2003	2004	2005	2006	2007
Egypt	75.0	81.00	86.60	94.9	56.7	64.5	62.7
Ethiopia	2.1	0.02	1.90	1.40	39.8	33.5	32.8
Eritrea	1.6	0.10	8.00	1.80	1.8	1.3	1.0
Djibouti	-	8.80	-	-	-	-	-
Kenya	21.2	10.10	3.40	1.90	-	-	-
Other countries	-	-	-	-	1.7	0.7	3.5

Source: Bank of Sudan, Annual Statistical Brief, 2004

Appendix 2. Suppliers of Sudan imports from COMESA countries share of total imports from (COMESA) 2001 – 2007 (percent)

Country	2001	2002	2003	2004	2005	2006	2007
Egypt	47.0	46.60	62.70	71.40	79.1	71.9	68.4
Kenya	31.4	28.70	18.80	12.70	8.7	6.7	7.9
Swaziland	-	-	2.90	3.30	3.3	10.0	12.0
Uganda	10.1	12.70	8.60	10.2	6.2	7.1	4.7
Other countries	11.5	12.0	7.0	2.4	2.7	4.3	7.0

Source: Bank of Sudan, Annual Statistical Brief, 2004

Appendix 3. Domestic taxes and protection for agricultural commodities in Sudan in the base period (2000-2002)

Market	World price US\$/ton	Tax rate (%)		
		r	t <sup>p</sup>	t <sup>c</sup>
Cotton	191.1	0.15	0.15	0.3
Gum Arabic	964	0.06	0.1	0
Sesame	580.4	0.15	0.4	0.3
Sorghum	131.2	0.06	0.1	0.29
Sheep	48.9	0.15	0.15	0.3
G. nuts	494.1	0.15	0.5	0.3
Sugar	342.5	0.6	0.5	0.29
Sunflower	227.3	0.15	0.5	0.3
Wheat	189.1	0.06	0	0

Note: r stands for the protection rate, t<sup>p</sup> is the producer tax and t<sup>c</sup> for consumer tax

Source: Calculated from the base period data (world price), taxes from the Customs Administration.

## ECONOMIC AND ENVIRONMENTAL IMPACT OF TRADE LIBERALISATION. ILLUSTRATIONS FROM EAST AND SOUTH-EAST ASIA

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**Abstract.** Although the globalization of the economic activities is the main trend, regionalism in the form of regional economic integration also began to develop around the end of the 20th century and has grown more rapidly in the 21st century. The current study evaluates the economy wide impact of trade liberalization in ASEAN region along with China, Japan and Korea (ASEAN+3) by the year 2020. The study also assesses the environmental impact of the trade liberalization in the region. Result shows that the countries under agreement (ASEAN+3) will benefit with increased output, and welfare due to liberalization. Further, the region not under agreement in the world will show a decline in output. Though Vietnam will be gaining with highest output growth among the ASEAN region, but the negative impact on the environment would also be expected. The implications on the environment will not be unfavourable for other participating countries under the agreement except Vietnam. This analysis provides useful insight in pursuing greater trade liberalization among the countries under the study with a "win-win strategy".

**JEL Classification:** F15, F18, C68

**Keywords:** GTAP, ASEAN+3, GHG emissions, Free Trade Agreement

### 1. Introduction

Since the start of the 1990s moves toward economic integration have progressed rapidly around the world, particularly in the form of free trade agreements (FTA). Even after the launch of the WTO multilateral trading system, FTAs/RTAs (Regional trade agreements) have continued to spread. However, there have been marked variances across regions in terms of the degree to which regional trade integration has been carried out. Regional integration moves have involved merely partial or loosely institutionalized groupings, i.e., AFTA (ASEAN Free Trade Area) and APEC (Asia Pacific Economic Cooperation). The interdependence among the East Asian economies through regional trade and financial linkages has increased. In addition, slow progress of multilateral negotiations under WTO and APEC has emphasized their shifting preference to

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regionalism. Recent developments in individual economies such as China's miraculous export-driven growth performance and entry into WTO, Japan's prolonged recession and desire to regain its leadership role in the region, Korea's regime change toward a more liberalized economic system, and Singapore's active intention to become a hub of regionalism can also be counted as factors behind the strategic change in the East Asian commercial policy for regionalism.

The Asian movement is now toward concluding free trade agreements (FTAs) and economic partnership agreements (EPAs). Each country in East Asia, including China and Japan, is accelerating its move towards concluding such agreements with other countries in the region. The potential of an "East Asian Free Business Zone" is becoming a reality by 2010.

It is expected that an East-Asian multi-lateral regional trading community will be established by 2020<sup>1</sup>. This multi-lateral regional trading community is expected to decrease the current barriers to trade between individual countries, expand the movement of goods and services between countries, and continue the economic growth within individual countries.

Economic growth has often also been accompanied by environmental degradation. Climate change, ozone depletion, and deforestation are often cited as examples of environmental problems that have resulted from economic growth. This region has also been plagued with various environmental problems resulted from rapid industrialisation and trade openness.

One of the on-going debates in trade discussions is how to protect the environment when multi-lateral regional trade agreements are being negotiated. Towards this direction the present study estimates the detailed economic wide impacts of trade liberalization in East and South East Asian countries by the year 2020. It also assesses the environmental impact of the trade liberalization for the same.

The rest of the paper is organized as follows. Review of the literature is presented in section 2. Section 3 explains the method of analysis briefly. Details of data bases, aggregation scheme and scenario development are described in section 4. Section 5 deals with the economy wide analysis of results. Section 6 explains the environmental impact focusing on three GHG emissions. Section 7 concludes the paper.

## **2. Literature survey**

There are numerous studies on the impact of trade liberalization including WTO impact, economic effects of RTAs and its sectoral and regional implications, environmental as well as poverty implications. The review of literature for the current study deals with the impact of trade liberalization covering various methodologies.

Burfisher, Robinson and Thierfelder (2004) carefully review the empirical findings on trade effect of RTAs focusing on the two methodologies adopted. They indicate that the empirical evidence found from CGE models is relatively more supportive for net trade creation effect and positive welfare effect of RTAs on member economies compared to the studies utilizing gravity models. With carefully considering caveats about CGE models, Lloyd and MacLaren (2003) suggest that there exist positive welfare and net trade creating effects of RTAs on members, while the effects on nonmembers are negative and tend to increase with the size of the RTA.

The other approach uses a gravity model of bilateral trade flows. Aitken (1973), Frankel (1993), and Braga, Safadi, and Yeats (1994) show that the RTA tends to generate more trade to its members. Most studies find that RTAs tend to increase trade between members and the rest of the world, and thereby foster greater trade worldwide. However, some RTAs are estimated to have negative effects on extra-bloc trade. Furthermore, Dee and Gali (2003) indicate that RTAs have diverted more trade from non-members than they have created among members.

There are number of studies attempted to address Regional Trade Agreements (RTAs) in Asia and Pacific. JETRO (2003) studied the trends relating to FTAs in East Asia and at the current state of trade within the region. Findings show that the realization of Japan-ASEAN Closer Economic Partnership (JACEP) between 1997 and 2020, would augment exports and boost gross domestic product in Japan. Thai-Japan FTA accompanying JACEP would boost both countries exports and realizing greater benefits than could be expected from ACFTA. Among the FTA proposals under negotiation, social welfare of Thailand would be best served by a bilateral trade with Japan. Park (2006) evaluates the effects on East Asian Regional Trade Agreements (RTA), which include expansionary, duplicate and overlapping RTAs by applying a computable general equilibrium model analysis. From scenario analysis, it is found that expansionary RTAs such as an ASEAN+3 (or +6) or a Global Asia RTA, are the optimum strategy for East Asian members and the world economy in terms of net trade creation, welfare improvement and output growth. Chawin (2006) evaluates the economic effects of the East Asia regionalism through ASEAN +3. The ASEAN - China and ASEAN-Korea and China-Korea FTA contract might do more harm than good to the future of ASEAN. If East Asia regionalism under ASEAN +3 is achieved, benefit will occur. However, ASEAN will be loser, if the big three in northeast Asia can form FTA among themselves. Lee and Park(2004) attempt to estimate quantitatively the economic impact of possible East Asian free trade areas based on a bilateral gravity model, and evaluating the main characteristics of the proposed FTAs. They conclude that the trade creation effect expected from the proposed East Asian FTAs will be significant enough to overwhelm the trade diversion effect. Urata and Kiyota (2003) found that the East Asia FTA induces strong trade diversion effect. However, as increased trade between member countries induces the expansion of market size, RTAs can provide non-member countries with the opportunities to exploit the large market too. Ando and Urata (2006) attempt to find the likely impacts of East Asian FTA involving ASEAN members and non members. They found that ASEAN+3 FTA is the most desirable among the eight hypothetical FTAs to all member countries at the macro level. Scollay and Gilbert (2001) argue that RTAs involving a sub-block of East Asian countries could have a negative impact on nonmembers. Thierfelder et al.(2007) using a global general equilibrium trade model, indicates that the integration of east and south East Asia with the creation of free trade area would increase welfare in the region and generate small losses for countries outside the block. Strutt and Rae (2007) focus on some of the agreements that China is currently negotiating. They explore how such preferential trade agreements might impact on one another. They use the dynamic GTAP model to assess the anticipated impact of possible liberalization scenarios.

Literature on energy-economy-environment-trade linkage, an important objective in applied economic policy analysis, is growing. Tsigas et al. (2004) investigated the impact of trade policy on the environment using GTAP modeling. It involves trade liberalization in the Western Hemisphere – a topic which has received considerable discussion in the past decade, and one that raises many environmental concerns. They found that trade liberalization in the Western Hemisphere is likely to benefit all participating countries. However, it guarantees neither improved environment nor more degradation. Burniaux (2001) analyses the influence of international investment reallocation in the context of unilateral reductions of GHGs emissions undertaken by industrialized countries. Results show that, for most parameter values, the amount of leakage associated with the implementation of the Protocol remains modest. In particular, the existence of investment reallocation may become much more influential under certain circumstances related to different types of investor's expectations, different levels of inter-fuel substitution, a longer time horizon and the existence or not of alternative carbon-free energy sources (called "backstops" energies).

There are few GTAP literatures focusing on trade liberalization and its impact on environment. Kang and Kim (2004) analyzed the air pollution impact in Korea induced by trade liberalization between Korea and Japan using a standard multi-region CGE model based on GTAP database Ver. 5.0. The simulation results show that the aggregated environmental effect depends on the change of specialization structure between pre and post trade liberalization. Free trade agreement between Korea and Japan reduces the overall air pollution emission by 0.36% but increases the pollution disposal cost slightly by 0.06%. This analysis provides useful environmental policy guidelines for pursuing a "win-win strategy" in trade. Strutt and Anderson (2002) illustrated with a case study of Indonesia, a large newly industrializing country, rich in natural resources and committed to taking part in major multilateral and regional trade liberalizations over the next two decades. The study concluded that, at least with respect to air and water, trade policy reforms slated for the next two decades would in many cases improve the environment and reduce the depletion of natural resources and in the worst cases would add only slightly to environmental degradation – even without toughening the enforcement of existing environmental regulations or adding new ones, and even if the reforms stimulate a faster rate of economic growth. Eickhout et al. (2004) quantify the impact of trade liberalization on developing countries and the environment. They found that liberalization leads to economic benefits. The benefits are modest in terms of GDP and unequally distributed among countries. Developing countries gain relatively the most. However, between 70 and 85 per cent of the benefits for developing countries is the result of their own reform policies in agriculture. Trade liberalization will have environmental consequences, which might be positive or negative for a region. They suggested that environmental and trade agreements and policies must be sufficiently integrated or coordinated, to improve the environment and attain the benefits of free trade. Evaluating the existing literatures we find that the works on the impact of trade liberalization on the economy and environment involving ASEAN countries along with China, Japan and Korea are not large. The current paper contributes to this.

### **3. GTAP Model**

The database and model is called the Global Trade Analysis Project (GTAP) (Hertel, 1997). The basic structure of the Global Trade Analysis Project (GTAP) model includes: industrial sectors, households, governments, and global sectors across countries. Countries and regions in the world economy are linked together through trade. Prices and quantities are simultaneously determined in both factor markets and commodity markets. Three main factors of production are included in the model: labour, capital, and land. Each industrial sector requires labour and capital, while the agricultural and forestry sectors require all three factors. Labour and land cannot be traded while capital and intermediated inputs can be traded. It is assumed that the total amount of labour and capital available is fixed.

In the model, firms minimize costs of inputs given their level of output and fixed technology. The production functions used in the model are of a Leontief structure. This means that the relationship between fixed and intermediate inputs is fixed. Similarly, the relationship between the amount of intermediate inputs and outputs is also fixed. Firms can purchase intermediate inputs locally or import them from other countries.

Household behaviour in the model is determined with an aggregate utility function. Current government expenditures go into the regional household utility function as a proxy for government provision of public goods and services. Domestic support and trade policy (tariff and non-tariff barriers) are modeled as ad valorem equivalents. These policies have a direct impact on the production and consumption sectors in the model. Changes in these policies will have an impact on the production and consumption decisions of sectors in the model.

There are two global sectors in the model: transportation and banking. The transportation sector takes into account the difference in the price of a commodity as a result of the transportation of the good between countries. The global banking sector brings into equilibrium the savings and investment in the model.

In equilibrium, all firms have zero real profit, all households are on their budget constraint, and global investment is equal to global savings. Changing the model's parameters allows one to estimate the impact from a countries/region original equilibrium position to a new equilibrium position.

Closure plays a very important role in GTAP modeling. Closure is the classification of the variables in the model as either endogenous or exogenous variables. Closure can be used to capture policy regimes and structural rigidities. The closure elements of GTAP can include: population growth, capital accumulation including FDI, industrial capacity, technical change, and policy variables (tax, subsidies).

The number of endogenous variables has to equal the number of equations. This is a necessary but not a sufficient condition for a solution. The standard GTAP closure is characterized by all markets are in equilibrium, all firms earn zero profits and the regional household is on its budget constraint.

### **4. Model aggregation, Scenario development and macro variable assumptions**

The GTAP model and database used to undertake the analysis is version 6. This version of the model includes 57 commodities (sectors) and 87 countries

(regions). The 87 countries were aggregated into 14 regions with an emphasis on the countries in the East Asian region. This aggregation includes 9 individual countries in East Asia and 5 other regions. The 9 individual countries are: Japan, Korea, China, Indonesia, Thailand, Vietnam, Malaysia, Philippine, and Singapore, while the other regions that have been aggregated are: rest of south East Asia as 'other ASEAN', NAFTA, rest of OECD, ROW1 (which includes South Asian countries and Hong Kong), ROW2 (combines the rest of the countries in the world). All 14 regions by 57 industrial sectors are included in the model.

### **Environmental indicators and coefficients**

The environmental indicators that have been considered for the present study are CO<sub>2</sub> (Gg), CH<sub>4</sub> (Gg) and N<sub>2</sub>O (Gg) collected from GTAP environmental databases for the six Asian countries (Thailand, Vietnam, Indonesia, China, Japan and Korea). These databases are for CO<sub>2</sub> emissions (V6.2, Lee, 2006) and non-CO<sub>2</sub> GHG emissions (CH<sub>4</sub>, N<sub>2</sub>O) by 57 sectors and 87 regions (V6.2, Lee, 2006a). To estimate the environmental coefficients used in the model we considered total industrial output for the sectors as reported in the GTAP model. This allows for consistency in the denominator.

### **Scenario Development**

Here three scenarios have been attempted:

a) Business as Usual, b) Medium economic integration, c) Deep economic integration. We are taking the 2000 model and using our macroeconomic shocks to generate a new economy for 2010, 2015, and 2020. In this analysis the tariff structure for all regions and countries remains as they are in 2000. This Business As Usual (BAU) remains the same throughout the analysis and is the base from which the other scenarios will be compared. Medium Economic Integration describes a situation where the timing of the tariffs reductions, both import tariffs and export subsidies, is delayed. This has been done for within ASEAN (W-ASEAN) and ASEAN with a bilateral agreement with China, Japan, and Korea (ASEAN-CJK) together. Deep Economic Integration expresses a situation where economic integration, reductions in both import tariffs and export subsidies, occurs in a rapid timeframe. This has also been done for both within ASEAN (W-ASEAN) and ASEAN with a bilateral agreement with China, Japan, and Korea (ASEAN-CJK) together. The last simulation (ASEAN+3) was part of the DEI scenario. In this simulation, tariff barriers were reduced by 80 percent and 100 percent for agricultural and non-agricultural commodities, respectively, for the ASEAN plus Japan, China, and Korea. This simulation differed from all of the other simulations because in this case the tariff barriers between Japan, China, and Korea were also reduced to defined levels. The above scenario description required a change in the development of the GTAP model to undertake the analysis. In this case, the up-dating of the model to 2020 would require a number of discrete steps. These steps and the models that were estimated are described in table 1.

### **Modifications of the GTAP Model to 2020**

In order to undertake the scenario analysis, it was decided that the static GTAP model with a base year of 2000 would be inappropriate. This was because the scenario development required the removal of tariff barriers over time. As a result, the GTAP model of base year had to be up-dated to the year 2020. For the current

study we have considered the recursive updating process. The recursive process uses projections of macroeconomic variables into the future to simulate what the various economies would look like in the future.

### **Macroeconomic Variable Estimates and Underlying Assumptions**

The first step in the process was to develop a BAU projection to 2010 from the benchmark 2000 GTAP6 data base. This BAU scenario projection is developed to provide a picture of how the global economy and world trade might look with the current tariff barriers. It provides a baseline to compare the implementation of the trade agreements. The projection of the global economy to 2010 was made with assumptions concerning economic and factor growth rates. Exogenous projections of each region's GDP growth (World Bank, World Development Indicators, 2007) were estimated in addition to estimates of factor endowments such as population, skilled and unskilled labour and capital stock (Walmsley, 2007 personal communication and Dimaranan, et al., 2007, UN2006, World Bank 2007). Instead of considering capital accumulation, we have added the extra change in  $It$  resulting from trade liberalisation shocks along with the baseline capital forecast for  $t+1$ . The resulting forecast provided a projection of the global economy in 2010 that was in equilibrium. This forecasted economy to 2010 provides the starting point for subsequent simulation exercise. Projections for the fundamental drivers of global economic change over the period 2015 and 2020 are also prepared in the manner.

### **5. Analysis of the results**

The model was run to address trade liberalization by simulating a regional trade agreement that decreased import tariff restrictions and export subsidy between the six individual countries and other ASEAN countries.

It is expected that the trade agreement will affect the country's output growth along with the share of export and import. The present study is primarily focusing on those results. Particular attention is given to how the changes in import tariff and export subsidy reductions affect the key variables such as trade patterns, terms of trade, industrial structure, and welfare levels along with poverty implications for each phase of agreement.

#### **Growth of Output**

Results show that the output growth rate is highest for China followed by Vietnam, Thailand and Indonesia and lowest for Japan in the BAU scenario (Table 2). The output growth of ROW1 is also higher compared to rest of OECD and NAFTA.

Trade liberalization has two offsetting effects on output levels. On the one hand, reductions in the costs of intermediate inputs create beneficial forward linkages to domestic production and promote industrialization (Puga and Venables, 1998). On the other hand, more intense import competition has an adverse effect on the profitability of import-competing firms.

Table 2 presents the percentage changes in output growth of each trade agreement phase compared to BAU period (2020).

Before proceeding to explain the East Asian countries' development in each phase of trade agreement, let's have a look at the world economy situation due to the ASEAN agreements. The percentage change in output growth of the world economy in all trade agreement phases is negative. The non agreement countries are the losers with negative output growth. The performance of the total

output growth of the ten agreement countries is highest in ASEAN +3 agreement at 2020. The output growth of the countries under the agreement fluctuates in each phase of trade agreement. The highest output growth is achieved by Vietnam followed by Thailand, Singapore, Malaysia and Indonesia in all trade agreement cases. The performance is not too rosy for Japan and Korea, though ASEAN +3 agreement is good for them. Besides that, Japan will be loser under DEI 2020 and Korea loser in case of MEI 2020. Though China's output growth is not significant but it shows a positive growth.

As expected, countries and regions included in the regional trade agreement have increased their industrial output, while regions not included in the regional trade agreement have decreased their industrial output. Reason behind this impact is as follows. A reduction of tariff on import lowers the import price, domestic users immediately substitute away from competing imports also the price of imports falls thereby increasing the aggregate demand for imports. The cheaper imports serve to lower the price of intermediate goods which causes excess profits. This, in turn, induces output to expand.

The result of output growth in different agreements during the period 2000-20 can be further analyzed by investigating the export and import share of each country among the study region and outside the region. China's export and import shares within the region under study declines during the course of the period (Table 3 and 4). As far as the shares are concerned, it has the lowest share compared to the other nine regions. For China, the share of export and import within the region varies between 23-25% in DEI and MEI. But in case of ASEAN +3, the share increased to 28% approximately for both the export and import. While the shares of Japan and Korea have increased gradually throughout the period (2000-10, 2000-15, and 2000-2020). Like China, for Japan and Korea the increase in share is noted only in ASEAN+3 agreement where the share has increased almost 10-12% compared to BAU 2020.

The export and import shares have increased for other countries in the region for all agreement cases (MEI, DEI and ASEAN+3). Overall, these shares show that the trade agreement in ASEAN countries with China, Japan and Korea will augment the growth of the individual economy under the agreement. The export and import shares in different tariff reduction scenarios show a considerable trade diversion. The simulation will lead to an increase in trade among the ten regions, basically it creates a more intra bloc trade, but diverts trade with non members. The highest trade diversion is observed in ASEAN+3 in 2020.

The sectoral rankings of output, and export in each agreement case across the countries can add more insight in the study. The top six sectors' rank in output growth is presented in table 5. The ranking remain almost constant in each BAU period (2000, 2010, 2015 and 2020), while fluctuations in ranking are observed within the sectors across the countries. In case of China, vegetable, fruits and nuts and animal products are in top ten in 2000 and 2010, but 2015 onwards electronic equipment is the new entry instead of other two. For Indonesia and Thailand, food products sector is major till 2015 taken over by manufacturing equipment and paper and paper products respectively in 2020.

In case of medium and deep integration, the same sectors are playing as top ten across the countries. The fluctuations in rankings within the sectors are observed for Indonesia, Thailand and Vietnam only. It is observed that paddy rice

is in third rank for Vietnam in 2020 BAU, but its rank has gone down to sixth in other scenario analysis.

With widespread liberalization, agricultural processing in these countries expands, placing competitive pressure on the agricultural processing in Vietnam. As the profitability of agricultural processing falls in Vietnam due to the increasing competition, Vietnamese labor and other resources move to the now more profitable labor intensive sectors such as clothing and light manufacturing, whose expansion is stimulated by the increased market access to the ASEAN countries. The output growth has increased for few common sectors (electronic equipment, machinery and equipment, chemical rubber and plastic) across the countries after 2015. These sectors are becoming more prominent in medium and deep integration. So the ASEAN+3 as well as other two integrations increase output in heavy manufacturing sectors for the countries under the agreement instead of primary and light manufacturing.

The ranking of export share for top six sectors is almost similar to that of the output shares across the countries except for one or two changes (table 6). For China, wearing apparel entered in place of mineral products. For Japan, metals nec entered in place of paper publishing, while for Indonesia coal and leather are in place of chemical rubber and plastic, and motor vehicle. Similarly for Korea, leather is in place of chemical rubber and plastic. Leather is replaced by motor vehicle in Thailand and Crops nec, instead of mineral products in Vietnam.

The export share ranks for top six sectors remain constant in medium and deep integration case. But few sectors' share has increased in each trade agreement. For example, electronics equipment for China and Thailand always ranked first in their export share. And this share has gone up from 17.63% (BAU2000) to 27.94% (ASEAN+3, 2020) in China and 24.08% to 36.18% in Thailand.

Most interesting result has been observed for Japan. The export share of different sectors has gone down during 2000 to ASEAN+3 agreement at 2020. For example, manufacturing equipment dropped down from 26% to 23%, electronic equipment from 20% to 11% and motor vehicles 17% to 15%. On the other hand, export share of Ferro alloys has gone up from 3.03% to 9% in the same period. A minor export share increase is observed for textile and motor vehicle sectors in Korea for the period 2000 to 2020 ASEAN+3 agreement. Similarly, manufacturing equipment has also increased its share from 11% to 16% during the same period. For Vietnam, chemical rubber and plastic sector is a new addition in the export list especially in the trade agreement phase with a large share of 25.90 % (ASEAN+3). But paddy rice shows in the list in all trade liberalization scenario cases. Further, two new additional sectors are on the list, which cover almost 32% of the export share. In Thailand, the export share of electronic equipment and manufacturing equipment share have increased by 1.5 fold.

In the case of Vietnam, after tariff reductions the tradable commodities like paddy rice responded quite significantly. Vietnam is the third largest rice exporting country in the world and has recently pursuing policies to expand its rice export market. Vietnamese rice export regime involved an export tax until 1998 but after then the Govt of Vietnam removed the rice export quota (export tax equivalent of rice export quota, Nielsen, 2003). On the other hand, Thailand has had a comparative advantage in electrical and electrical equipment since the 1990s. The implications of tariff reductions on the electrical and electronic appliances are quite

obvious in Thailand. The export-led industrial boom began in the mid-1980s in Thailand and electrical and electronic appliances captured market shares of 21.55 per cent in 1990 and 48.87 per cent in 2000 (Mukhopadhyay, 2006).

From the above export share scenario, it is clear that the export sectors are not too sensitive for Japan, but it is sensitive for other countries like Thailand, Vietnam and Indonesia. Here the question arises whether at all these export sectors are dominating in the ten regions for these countries. It is interesting to note that ferrous metal is always in the top six lists for Japan in the entire DEI scenario, but again for higher tariff reduction case metal nec is added in the list. Similarly for Thailand sugar is added in the top six lists as it is moving to higher tariff reduction.

In case of import, the share of the top six sectors differs in the trade agreement phase across the countries. Some new sectors have entered in the list due to trade agreement compared to BAU. But one interesting point is to be noted that top six sectors are common in exports and imports in most cases. This has happened due to intra industry trade. Intra-industry trade occurs when a country exports and imports goods in the same industry. It represents international trade within industries rather than between industries. Such trade is more beneficial than inter-industry trade because it stimulates innovation and exploits economies of scale. Further, international trade is largely trade within broad industrial classifications. Here we considered 2000 BAU as a representative of all other BAU period (2010, 2015, and 2020). Though the percentage shares fluctuate within the BAU period but the sectors remain constant.

One thing should be mentioned in this respect that net gain or loss to the countries depends on the relative sizes of the trade creation and diversion effect. On the other hand, import liberalization typically brings about an increase in exports by changing the real exchange rate. Lowering the domestic price of at least some imports will cause consumers to substitute these goods for non-traded goods. This reduction in the profitability of non-traded good production makes production for export relatively more attractive and increases the supply of exports.

### **Welfare and Poverty implication**

Welfare gains from multilateral liberalization are fundamentally determined by two factors: the change in the efficiency with which any given economy utilizes its resources, and changes in a country's terms of trade. If the region in question experiences a terms of trade improvement, i.e., export prices rise relative to the import prices. If the terms of trade deteriorate, then the opposite will happen. However, the impact of welfare varies between large and small countries. In the present analysis, we have both small economy like Vietnam and Thailand as well large like Indonesia, China. How welfare impacts of the different trade liberalization do varies across the fourteen regions is presented in table 7. From table 7, we can observe that the final round of trade liberalization under the MEI scenario and the DEI ASEAN + 3 scenarios leads to increase of global welfare. However, further analysis shows that the gain in welfare are mainly attributed to the ten regions involved in the trade liberalization while the rest of the regions faces a loss in welfare with the exception of ROW2 under the MEI scenario. Yet, not all the gain in welfare is distributed evenly among the ten regions involved. In the MEI scenario, China, Malaysia and Thailand are the regions that experience the greatest welfare increase while Korea actually faces a decline in total welfare. When we extend this

trade liberalization to include tariff reductions between China, Japan and Korea under the DEI ASEAN+3 scenario, China, Korea and Thailand are now the 3 regions with the most welfare increase while Japan experienced a welfare decline. From these two scenarios, China and Thailand appear to gain most welfare from trade liberalization in the region.

If we further decompose these two results (table 7), most region involved in the trade liberalization scenarios improved in their allocative efficiency resulting an increase in the global allocative efficiency. However, the exceptions are of Singapore in the MEI scenario and Japan in the ASEAN+3 scenarios which experience a deterioration in allocative efficiency (−8249.6 million USD). On the other hand, the various trade agreements appear to have brought a huge deterioration in terms of trade for China in both scenarios (MEI and ASEAN+3). Already we found that the tot effect is negative for China, Japan and Korea in MEI 2020 while a positive tot effect is observed for Japan and Korea under DEI ASEAN+3.

An attempt has also been made to capture the poverty implication from the study.  $U$  and  $y$  define the per capita utility of aggregate household expenditure and regional household income respectively. Both are positive for China and all other countries under two agreements. This implies that household expenditure and income has increased in all the countries. However, it is reduced in MEI 2020 for Japan and Korea.

To look further into the poverty aspect, the wage of unskilled labour is taken into account. This is compared with the GDP. Results show that the return for unskilled labour is higher than the growth of GDP for all six countries in MEI scenario. But for ASEAN+3 agreement, we observed the opposite (Table 8). The overall household expenditure income of the countries under the agreement improved but this improvement will not touch the poorer section<sup>2</sup>. From this analysis we are inclined to conclude that ASEAN+3 at all materialize it will not change the poverty situation of the country, even though the countries are expecting to be benefited overall.

From the above analysis, it is observed that Japan will be loser in DEI, but gainer in ASEAN+3 and MEI. It experiences negative output growth, followed by the reduction of both export and import share in DEI compared to BAU. Korea will be loser in MEI. Though it has a negative output growth, the export increased marginally but import reduced compared to the BAU. While real output growth is insignificant in different trade scenarios, China will be a gainer in all trade agreement phases. Its export and import share has also increased marginally compared to BAU. Other agreement countries will benefit with increased industrial output growth due to trade liberalisation, among them Vietnam ranking first in different scenario cases along with Thailand. It is also observed that if the economy moves to higher tariff reduction scenario, greater will be the output growth so also export and import for the agreement countries (except china, Japan and Korea). While non-agreement countries have decreased industrial output growth and are the losers in all scenario cases. Moreover, the direction of trade for the member countries is concentrating within the region under agreement predicts a trade diversion movement (i.e. away from non agreement countries). Further, if ASEAN+3 at all materializes it will not improve the poverty situation of the country, even though the countries are expecting to be benefited overall.

The region specific analysis shows that Vietnam's performance is significant compared to other ASEAN countries in our scenario analysis. This is also reflected from the recent ADB country report. Viet Nam's economy is robust and continues to expand rapidly with GDP growth of 8.3% in 2007, and 8.5% in 2008. The country indeed has been making a good progress in its economic development and reforms. Buoyant investment and consumption drove robust economic growth. Buoyant investment led to a steep 30.4% increase in merchandise imports in the first half of 2007, and imports of capital goods surged by 46.5%. Imports of raw materials and intermediate goods were also vigorous. With regard to exports, following WTO accession, textiles and clothing rose by 25.9% in the first half of the year after the abolition of quotas, and wooden furniture exports also increased by 23% (Asian Development Bank report, 2007). Our current research supports this view. In our current study wearing apparel (10.29%) is the important export item under top six sectors list of Vietnam. But ASEAN+3 agreement in 2020 will increase the share to 16% together with textile.

The share of the top six sectors differs depending upon the trade agreement phase across the countries. Some new sectors have entered the top six sectors due to the trade agreement scenarios when compared to BAU. The percentage shares of the top sectors fluctuate but the sectors themselves remain constant from BAU to ASEAN+3. The top six sectors in both exports and imports are common in most cases. This is due to intra industry trade. Shares are sensitive to high tariff reduction in Thailand, Vietnam and Indonesia. In China, Japan, and Korea, the changes in the sectoral performance of exports and imports are insignificant except for a few cases (Electrical equipment for China, Ferrous for Japan and Korea).

It shows that the composition of trade has changed during the course of the period (2000-10, 15 and 20) almost for all countries moving from agriculture and light industries towards heavy industries except Japan and Korea. And this strategy maintained in all simulation cases. JETRO (2003) shows that the East Asian FTA will boost the exports of IT products along with synthetic rubber and plastic and steel within the region. These sectoral performances from different trade reform scenarios will help us to think of the environmental implications.

## **6. Environmental Impact**

One of the on-going debates in trade discussions is how to protect the environment when multi-lateral regional trade agreements are being negotiated. Many environmental advocates argue that trade harms the environment and, by fostering more trade, liberalization is environmentally unfriendly. Others argue that, on the contrary, trade liberalization is beneficial to the environment. By reducing market distortions, which protect dirty industries and encourage excessive intensification of production, trade liberalization would improve environmental quality. Another argument put forth for increased trade liberalization is that it will increase the amount of environmental-friendly technology that is adopted. This occurs because capital and technology flow can move more freely under a regional trade agreement. Finally, others have argued that increasing ones environmental standards in the framework of regional trade liberalization results in increased competitiveness of firms in these countries as they become more innovative in their industrial processes. Thus, the impact of trade liberalisation on the environment has been a matter of debate.

In the earlier discussion (section 5) we have seen that trade pattern influences the composition and scale of exports that ultimately change the industrial output growth which, it is expected, will lead to impacts on the environment. In this section we shall deal with impact of trade liberalization on the environment focusing on GHG emissions (CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub>) for the countries under the study. It should be noted that the environmental coefficients are likely to change over time with technological improvement. Keeping this in mind we have updated the environmental coefficients<sup>3</sup> for the years 2010, 2015 and 2020. These updated coefficients are used to estimate the volume of emission in each scenario during the year. For example, we use the 2015 environmental coefficient to estimate the volume of pollution under different trade scenarios for the year 2015. Tables 9 through 11 provide estimates of the growth of CO<sub>2</sub> (Gg), CH<sub>4</sub> (Gg) and N<sub>2</sub>O (Gg) in BAU and other trade liberalization scenarios.

As far as growth in CO<sub>2</sub> emission is concerned, China is leading followed by Vietnam and Indonesia in BAU scenario. In almost all trade liberalization scenarios Vietnam's growth has increased significantly while for China, it has declined marginally compared to BAU. For Japan and Korea, CO<sub>2</sub> growth is insignificant under different trade scenarios compared to BAU in 2020. Other countries (Thailand and Indonesia) have shown increased growth in all trade scenarios compared to BAU. Thus, Vietnam's CO<sub>2</sub> growth is high during all the trade liberalization scenarios as compared to other countries.

As far as CH<sub>4</sub> growth is concerned, China is leading followed by Vietnam, Indonesia and Thailand during the BAU period. But Japan and Korea's growth is insignificant compared to other countries, but emission will increase marginally under the ASEAN+3 scenario. Thailand reduced its growth of CH<sub>4</sub> in all trade agreement scenarios compared to BAU drastically. Indonesia and China are also in the same path. Vietnam's CH<sub>4</sub> emission growth is significant in MEI compared to BAU. Paddy rice is responsible for this high growth of CH<sub>4</sub> in Vietnam. The highest N<sub>2</sub>O growth has been observed for Indonesia followed by China, Vietnam, Thailand, and Korea while Japan secures the lowest under BAU. Under various trade agreement (except ASEAN+3), Vietnam shows the highest growth. Transport nec and CRP are the major player in this case for Vietnam. But for other countries, N<sub>2</sub>O emission is reduced marginally in various trade scenarios compared to BAU.

Thus, the analysis of the growth of the three GHG emissions across the countries under BAU and different trade liberalization phases shows that Vietnam is leading. Japan and Korea will not be affected environmentally though the trade liberalization increases its output growth. For Thailand, the trade liberalization under different scenarios is growth inducing and pollution reducing in terms of CH<sub>4</sub> and N<sub>2</sub>O (except CO<sub>2</sub>). This implies that freer trade would likely to push Thailand away from agriculture (more CH<sub>4</sub> and N<sub>2</sub>O intensive) to industry (more CO<sub>2</sub> intensive).

The growth rate of each pollutant is not the same in the trade liberalization scenarios and BAU. Among three GHG indicators CO<sub>2</sub> responded significantly under different trade scenarios compared to BAU. But other indicators' responses in trade agreement phases are relatively insignificant. The overall change depends on the sectoral performances. Some sectors are sensitive for some pollutant in one country, but the same will not hold for the other country. Tables 12 show the CO<sub>2</sub> intensive sectors for across the countries.

The identity of CO<sub>2</sub> intensive sectors always differs across all countries (table 12). We have identified six prominent CO<sub>2</sub> intensive sectors for each country. These sectors remain important during both the BAU and the trade liberalization scenarios. The only observed change is the volume of CO<sub>2</sub> emission for some sectors that has increased under the trade liberalization scenarios. Sectors like chemical, rubber, plastic products and mineral products *nec* are the most common sectors with increased CO<sub>2</sub> emissions across the countries. More specifically, the sectors like CRP, electronic equipment and manufacturing equipment have increased its output and so also CO<sub>2</sub> emission in Thailand, Indonesia under different trade scenarios. Apart from these sectors, CO<sub>2</sub> emissions from textile and wearing apparel's have increased in Vietnam and Indonesia in various trade liberalization scenarios. On the other hand, the paddy rice and animal products sectors are common sectors with rising CH<sub>4</sub> emissions across the countries, while the transport *nec*, vegetables, fruits and nuts sectors are common sectors with rising N<sub>2</sub>O emissions.

In this connection, we account the total GHG emissions in the region. To estimate the total GHG emissions we need to arrive at one common unit for CH<sub>4</sub> and N<sub>2</sub>O i.e., CO<sub>2</sub> equivalent<sup>4</sup> (UNFCCC, 2004). The total GHG emission for six countries will be 20789421Gg of CO<sub>2</sub> equivalent in BAU 2020 (i.e.244.88% increase in 20 years). It is interesting to note that the GHG emission will decline marginally under different trade liberalization scenarios. For MEI, DEI and ASEAN+3 scenarios, it will drop by 0.26%, 0.34% and 1.25% respectively compared to BAU2020 (table 13). Though the CO<sub>2</sub> growth is high in BAU and different trade liberalization scenarios, the GHG emission is declining marginally and it is made possible due to the slower growth of CH<sub>4</sub> and N<sub>2</sub>O. It reflects that high CO<sub>2</sub> growth is compensated by the low CH<sub>4</sub> and N<sub>2</sub>O emission. This implies that freer trade will not always be environment unfriendly. Thus our findings also provide more light on the on going trade environment debate.

## 7. Conclusion

East and South East Asian free trade agreements will increase output growth for all participating countries in the agreements. Other countries will have a marginal negative growth. Among the countries, Viet Nam will achieve the highest growth followed by Thailand. The lowest positive growth is attained by Japan and the Republic of Korea. Japan is net loser under the DEI 2020 scenario, but a net gainer under the ASEAN+3 and MEI 2020 scenarios. ASEAN+3 is favourable for all participating countries in this Agreement. China is a net gainer in all trade liberalization scenarios though real output growth is insignificant.

It is also observed that if an economy moves to a higher tariff reduction scenario (e.g. a deeper trade integration scenario), output, export and import growth will all increase for the participating countries under such a scenario (except China, Japan and the Republic of Korea), while non-agreement countries decrease industrial output growth and are losers in all scenarios.. Moreover, the direction of trade for member countries in each agreement under various scenarios is concentrated within the region under the agreement which predicts a trade diversion movement (i.e. trade is diverted away from non- agreement countries). Further, if ASEAN+3 at all materializes it will not change the poverty situation of the country, even though the countries are expecting to be benefited overall.

The freer trade impact on the environment is not too severe. The CH<sub>4</sub> and N<sub>2</sub>O growth in MEI 2020 and DEI 2020 across the countries is marginal compared to BAU 2020, except Vietnam. The only difference is observed for CO<sub>2</sub>, a high growth from 2000 BAU to 2020 BAU. Due to high growth in output export and import, it is expected that the pollution growth will also be high. Japan and Korea will be in a win-win situation. Overall, trade agreement is not unfavorable for the environment except Vietnam. This is due to the high growth in output and export of the pollution intensive sectors and also its technological improvement is not at the desired level to reduce emission. Further, GHG emissions in CO<sub>2</sub> equivalent will have a marginal decline in different trade liberalization scenarios for all participating countries. Thus the findings of the paper reflect that freer trade will not always be environment unfriendly for the region under study and also throw positive insight on the trade and environment debate.

## Notes

(1) At the Ninth ASEAN Summit in Bali in October 2003, ASEAN leaders have agreed to establish an ASEAN Economic Community (AEC) by 2020. The AEC is one of three pillars (the other two being the ASEAN Security Community and the ASEAN Socio-cultural Community) that make up the ASEAN Community as declared by ASEAN leaders in the Bali Concord II. In line with the ASEAN Vision 2020, it is envisaged that the AEC will be a single market and production base with free flow of goods, services, investments, capital and skilled labour (Hew,2006).

(2) Here poorer section we mean unskilled labour.

(3) Updated coefficients for GHG emission across the countries  
To update the coefficients, we considered the past behaviour of the emission. We prepared 1995 and 2000 emission coefficient to calculate the growth of the emission coefficients. The change in growth of these emission coefficients over these five years was used to estimate 2010, 2015 and 2020. Data on both industrial output and GHG emissions have obtained to estimate the GHG emission coefficients (57 sectors) for the year 1995.

(4) CH<sub>4</sub> and N<sub>2</sub>O are converted to CO<sub>2</sub> equivalent in Gg by using global warming potential (GWP) indexed multipliers of 21 and 310 respectively.

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## APPENDIX

Table1. Business as Usual, Medium, and Deep Scenarios Descriptions

Business as Usual (BAU)				
Regional scope	Commodity scope	By 2010	By 2015	By 2020
ASEAN, Whole study region (ASEAN + 3), Other regions	All commodities	Current tariffs	Current tariffs	Current tariffs
Tariff Reductions Under Medium Economic Integration (MEI)				
Regional scope	Commodity scope	By 2010	By 2015	By 2020
Within ASEAN, ASEAN with each of Japan, China, and Korea	Agricultural Commodities		40%	80%
	Non-Agricultural Commodities		50%	100%
Whole study region (ASEAN + 3)	Agricultural Commodities			
	Non-Agricultural Commodities			
Tariff Reductions Under Deep Economic Integration (DEI)				
Regional scope	Commodity scope	By 2010	By 2015	By 2020
Within ASEAN, ASEAN with each of Japan, China, and Korea	Agricultural Commodities	40%	80%	
	Non-Agricultural Commodities	50%	100%	
Whole study region (ASEAN + 3)	Agricultural Commodities			80%
	Non-Agricultural Commodities			100%

Table 2. Percentage Change in the real Value of Output during 2000-2020 and trade Scenarios

	2000-10	2010-15	2015-20	BAU2020- MEI2020	BAU2020- DEI2020	BAU2020- ASEAN+3
China	137.68	53.22	54.39	0.227	0.220	0.245
Japan	21.39	11.15	11.05	0.039	-0.054	0.008
Korea	60.08	28.41	29.38	-0.205	0.154	0.308
Indonesia	68.88	36.27	37.78	1.302	1.968	2.304
Malaysia	66.04	33.41	34.07	2.062	2.335	3.302
Philippines	54.5	26.23	27.15	2.004	2.705	2.310
Singapore	58.88	26.19	25.77	3.056	3.299	2.070
Thailand	69.58	33.2	34.62	5.310	7.808	6.883
Vietnam	97.43	41.74	40.06	6.522	8.413	13.587
Other ASEAN	53.31	26.3	26.28	0.043	0.253	0.138
Rest of OECD	24.4	12.91	14.47	-0.273	-0.147	-0.606
NAFTA	34.36	16.83	15.6	-0.260	-0.266	-0.687
ROW1	71.33	35.2	31.75	-0.714	-0.754	-0.765
ROW2	53.63	25.05	24.72	-0.163	-0.227	-0.608
Total	40.59	21.2	22.27	-0.078	-0.036	-0.298

Table 3. Export share (%) among ten regions in different scenarios

Export	2000	2020	MEI2020	DEI 2020	ASEAN+3
China	24.4	20.21	25.12	25.18	28.93
Japan	29.54	39.97	41.57	41.53	54.79
Korea	34.66	41.93	42.24	42.36	57.88
Indonesia	43.85	45.72	60.25	60.05	63.82
Malaysia	41.75	47.93	62.17	61.91	64.36
Philippines	38.01	40.89	52.68	52.6	56.82
Singapore	39.48	48.24	63.93	63.67	65.97
Thailand	38.17	41.83	61.5	60.25	67.23
Viet Nam	37.57	48.78	67.29	67.49	81.53
Other ASEAN	41.98	64.36	64.68	65.07	69.88

Table 4. Import share (%) among ten regions in different scenarios

Import	2000	2020	MEI2020	DEI 2020	ASEAN+3
China	24.97	21.72	24.59	24.47	27.58
Japan	30.58	41.28	42.35	42.31	55.11
Korea	35.54	42.95	42.84	42.95	57.96
Indonesia	43.15	44.5	58.56	58.37	61.81
Malaysia	41.76	47.6	61.11	60.89	62.4
Philippines	37.97	40.96	52.53	52.59	56.79
Singapore	40.3	49.15	64.23	63.96	66.16
Thailand	39.08	42.24	61.37	61.99	69.48
Viet Nam	38.01	49.05	62.57	68.45	83.27
Other ASEAN	41.24	63.36	62.94	64.08	68.51

Table 5. Top six sectors rank in output growth BAU 2020

China	Japan	Korea	Indonesia	Thailand	Vietnam
Machinery and equipment nec	Motor vehicles and parts	Machinery and equipment nec	Electronic equipment	Electronic equipment	Mineral products nec
Chemical, rubber, plastic products	Chemical, rubber, plastic products	Electronic equipment	Textiles	Machinery and equipment nec	Leather products
Electronic equipment	Electronic equipment	Chemical, rubber, plastic products	Chemical, rubber, plastic products	Motor vehicles and parts	Paddy rice
Textiles	Machinery and equipment nec	Ferrous metals	Paper products, publishing	Textiles	Oil
Mineral products nec	Ferrous metals	Motor vehicles and parts	Machinery and equipment nec	Chemical, rubber, plastic products	Food products nec
Manufactures nec	Paper products, publishing	Petroleum, coal products	Motor vehicles and parts	Wearing apparel	Machinery and equipment nec

\* not elsewhere classified

Table 6. Share of top six sectors export in 2000(BAU) and 2020(ASEAN+3)

BAU2000	China		Japan		Korea
40 ele	17.64	41 ome	26.06	40 ele	28.26
41 ome	15.05	40 ele	20.86	41 ome	11.59
42 omf	11.07	38 mvh	17.84	33 crp	10.24
28 wap	9.69	33 crp	9.22	38 mvh	8.83
29 lea	8.33	39 otn	3.73	27 tex	7.69
33 crp	6.31	35 i_s	3.30	39 otn	5.48
	Indonesia		Thailand		Vietnam
40 ele	12.41	40 ele	24.08	29 lea	17.58
30 lum	8.72	41 ome	12.30	16 oil	13.91
33 crp	7.51	33 crp	8.91	28 wap	10.29
28 wap	6.81	25 ofd	6.81	25 ofd	8.83
27 tex	6.48	42 omf	4.28	41 ome	5.14
41 ome	5.51	27 tex	4.07	8 ocr	5.10
ASEAN+3	China		Japan		Korea
40 ele	27.95	41 ome	23.73	40 ele	25.55
41 ome	19.26	38 mvh	15.82	41 ome	15.46
42 omf	12.06	33 crp	12.64	33 crp	9.05
28 wap	6.85	40 ele	11.12	27 tex	8.91
33 crp	6.82	35 i_s	8.46	38 mvh	8.58
27 tex	5.51	36 nfm	4.63	35 i_s	6.89
	Indonesia		Thailand		Vietnam
40 ele	19.49	40 ele	36.18	33 crp	25.90
27 tex	10.48	41 ome	19.11	29 lea	18.87
33 crp	10.07	33 crp	13.20	16 oil	14.97
41 ome	7.65	24 sgr	5.07	28 wap	8.82
31 ppp	6.56	38 mvh	3.52	27 tex	6.71
15 coal	5.38	27 tex	3.33	41 ome	6.56

Sgr- Sugar, ofd- Food products nec, tex-Textiles, Wap-Wearing apparel, Wap-Wearing apparel, Lea-Leather products, Lum-Wood products, ppp -Paper products, publishing, p\_c-Petroleum, coal products, crp-Chemical, rubber, plastic prods, nmm -Mineral products nec, i\_s -Ferrous metals, nfm - Metals nec, mvh - Motor vehicles and parts, otn -Transport equipment nec, ele -Electronic equipment, Ome- Machinery and equipment nec, omf -Manufactures nec , Ely-Electricity, Otp-Transport nec

Table 7. Welfare decomposition in different trade scenarios

	MEI2020			ASEAN+3 2020		
	Allocative Efficiency	tot	Total	Allocative Efficiency	tot	Total
China	10072.4	-5991.6	4373.1	27833.1	-13692.5	15894.8
Japan	2253.5	-707.1	1627.9	-8249.6	7686.1	-1624.8
Korea	477.8	-726.1	-225.2	1849	4416.3	5939.1
Indonesia	1059.4	1793	2753.2	634.9	130.8	894.1
Malaysia	2909.8	3183.7	6688.9	2092.5	-272.4	2070.3
Philippines	996.6	374.3	1379.3	477.9	-108.6	375.1
Singapore	-222.1	3108.6	3035.3	81	993.4	1115.4
Thailand	3628.4	3088	6842.3	2217.3	6504.2	8833.7
Vietnam	2812.1	360	3578.3	1692.4	1292.3	4698
Other ASEAN	401.5	-139.3	238.4	541.1	-78.6	455.3
Rest of OECD	-847.8	-3613.7	-3976.6	-213.5	-3266.6	-3028
NAFTA	-652	-1771.1	-3888.6	-580.8	-1512.4	-4158.4
ROW1	-1431.7	-2200.6	-3743.3	-1700.3	-4094	-6033.8
ROW2	-1248.1	3241.8	1526.9	-1750.1	2002.1	-505.9
Total	20209.7	0	20209.7	24924.9	0	24924.9

Table 8. Poverty implication

	ASEAN+3 2020				MEI2020			
	Un Skilled Wages (%)	VGDP	U	Y	Un Skilled Wages (%)	VGDP	U	Y
China	1.04	-0.032	0.37	0.02	0.519	0.069	0.1	0.08
Japan	0.259	1.034	-0.04	1.04	0.004	-0.071	0.04	-0.1
Korea	0.765	2.948	0.8	3.16	0.199	-0.227	-0.03	-0.24
Indonesia	-0.277	0.716	0.25	0.8	1.737	1.678	0.8	1.78
Thailand	0.271	5.998	4.4	7.4	4.079	4.979	3.5	6
Vietnam	10.067	11.542	4.76	11.9	11.883	7.803	3.85	8.19

Table 9. CO<sub>2</sub> growth (%) in different trade scenarios in 2020 from BAU 2001

CO2	BAU2001-2020	BAU2001-MEI2020	BAU2001-DEI2020	BAU2001-ASEAN+3
China	331.50	328.46	328.89	323.12
Japan	24.62	25.17	25.18	25.73
Korea	87.03	88.11	89.33	87.94
Indonesia	248.09	255.63	256.74	260.59
Thailand	159.29	169.22	169.63	171.49
Vietnam	266.20	275.60	279.94	327.15

Table 10. CH<sub>4</sub> growth in different trade scenarios in 2020

CH4	BAU2001-2020	BAU2001-MEI2020	BAU2001-DEI2020	BAU2001-ASEAN+3
China	341.63	342.34	341.66	336.02
Japan	38.95	38.57	29.31	52.82
Korea	35.49	35.03	36.98	45.52
Indonesia	196.52	189.91	188.32	188.17
Thailand	145.46	128.83	111.31	90.67
Vietnam	276.75	282.33	275.22	277.38

Table 11. N<sub>2</sub>O growth in different trade scenarios in 2020

N2O	BAU2001-2020	BAU2001-MEI2020	BAU2001-DEI2020	BAU2001-ASEAN+3
China	211.54	211.09	210.36	208.12
Japan	40.23	40.18	39.77	40.45
Korea	112.31	108.90	110.29	114.37
Indonesia	251.97	251.45	243.71	241.83
Thailand	128.29	117.15	98.64	89.99
Vietnam	136.22	146.63	144.50	134.15

Table 12. CO2 intensive sectors for six countries (BAU)

China	Japan	Korea	Indonesia	Thailand	Vietnam
Coal	Mineral products nec	Mineral products nec	Oil	Petroleum, coal products	Metals nec
Oil	Machinery and equipment nec	Textiles	Petroleum, coal products	Mineral products nec	Manufactures nec
Gas	Paper products, publishing	Motor vehicles and parts	Machinery and equipment nec	Machinery and equipment nec	Petroleum, coal products
Ferrous metals	Chemical, rubber, plastic products	Transport equipment nec	Manufactures nec	Forestry	Mineral products nec
Mineral products nec	Textiles	Chemical, rubber, plastic products	Ferrous metals	Chemical, rubber, plastic products	Electronic equipment
Chemical, rubber, plastic products	Fishing	Paper products, publishing	Electronic equipment	Minerals nec	Paper products, publishing

Table 13. Total GHG Emission in CO2 equivalent for six countries (Gg)

	BAU2000	BAU2020	MEI2020	DEI2020	ASEAN+3
Total emission in six countries	6027845.1	20789421	20735162 (-0.26)	20716693 (-0.34)	20527530 (-1.25)

The terms inside the bracket represents %change from trade scenarios and BAU 2020

## ABOUT MODELING THE ERP SYSTEMS

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**Abstract.** One of the most important scopes of choosing a development and modeling methodology is the minim costs. Also are very important the basis elements, elimination of an important number of activities and reducing the implement time and costs. In this paper we investigate the relation between modeling software and ERP systems, models of software engineering and technology. We apply the models of software engineering like the Waterfall model, the Incremental model, the Spiral model and XP model in modeling the ERP systems. We are motivated by recent advanced on modeling domain knowledge.

**JEL Classification:** C82

**Keywords:** ERP systems, modeling, software engineering, waterfall model, incremental model, spiral model, XP model

### 1. Introduction

Modeling is a method used in science and technique and consists in schematically reproduction of an object or system as a similar system or analogue with the scope of studying the properties and transformation of the original system. The decision of choosing a model must be based on a very precise list of selection criteria and comparative analysis of some variants of applications for:

- The legislative frame of each country;
- The European standards and legislation;
- Real – time processing;
- The modular structure of software which must permit implementing on steps and further extension of functional area;
- The independence of hardware platform;
- Functionality characteristics;
- The assurance of a high level of security and data integrity;
- Flexibility in rising the number of users;
- Direct advantages;
- The possibility of justification of the investments;
- The risk minimization.

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## 2. The current stage of knowledge in this domain

"*Process Modeling in ERP Systems*" is a detailed paper focusing upon potential memory mismatches that may arise with respect to the embedding of process knowledge within ERP packages ([http://www.w3j.com/3/process\\_modeling.html](http://www.w3j.com/3/process_modeling.html)). Goyal et al. (2008) observed that many times, the ERP systems are implemented without any planning or proper preparedness in the organisations. As a result, "ERP systems prove to be a big failure, leading to a state of bankruptcy for the organisation." This paper is an empirical study in two large Indian organisations with the objective of designing a planning model for the implementation of ERP systems.

Tyler et al. (2005) tell that "Many companies look to SOA for integration and visibility. SOA can give you capabilities in managing CRM and ERP systems that few other architectures support, specifically around linking your CRM & ERP systems to your ITSM processes. Many companies currently manage the infrastructure of their CRM & ERP systems using ITIL/ITSM tools like OpenView, Tivoli, Patrol, etc.; but they only manage the physical systems, what about the software, or processes. What would you do to be able to link the processes in your CRM or ERP system to your ITIL/ITSM tool? Imagine if you will, to be able to model the processes that you use in your CRM & ERP system, import those processes into a process-monitoring tool, then correlating data from those systems into the monitored processes. But how would you do it?"

Van Stijn (2001) say that there were focused "on potential memory mismatches that may arise with respect to the embedding of process knowledge within ERP packages. Packages such as SAP provide a varied and rich environment for process modeling. However, we suspect that there are still many instances where process knowledge is either lost or represented in different ways in different parts of the organization. As we will discuss, the results of such memory mismatches will often not become evident until the system is in use. The overall thrust of the paper is to identify a variety of concerns, intriguing questions and avenues for future research".

In the article "*Enterprise Integration Modeling for Extended Enterprise in ERP Systems*", their authors (Dos Santos et al. in 2008) tell that : "This article presents the main difficulties in the implantation of ERP systems and proposes a modeling methodology for networking enterprise with CIMOSA and UML." Indiha (2008) argues that "Companies and other organisations use ERP systems more and more extensively. The problem is that many projects of this type are unsuccessful, mostly due to their complexity being underestimated. A special emphasis is given to business process modelling, because the key to a successful choice, implementation and usage of an ERP system is fit of planned processes in an organisation with processes implemented in the solution. The paper also presents some results of empirical investigation in the field of ERP implementation."

All these materials get to the next conclusions:

- Many times, the ERP systems are designed and implementing without any planning.
- The ERP system must support rather than several small and different systems.
- Implementation effort will be bigger if we don't analyse modeling of ERP systems.

- The existing papers in special literature treat too little modeling of the ERP systems

### **Purpose of the study**

The purpose of this study is to explore and describe the modeling methodology of Information Systems, particularly ERP systems, and also is very helpful for the businesses and software companies that desire to implement or upgrade the ERP basis system. The software companies also may enhance competitive capacity and actively dispose global strategy, especially in the current trend of the communication, postal communication and navigation, in the Information Society of XXI century.

In the same time, this study will help to find the answers to important questions about ERP systems, modeling and software engineering because currently, there is no effective approach to modeling of the prototype of ERP systems, as we present in the following paragraphs.

### **Materials and Methods**

The synergetic aspects of the disciplines as e-Commerce, Databases Design, ERP Systems, Software Engineering, Business Information Systems Design increase and rise in quality the stage of research. The modeling of an ERP system has to base some important characteristics which individuate ERP solutions: *flexibility, modularization, portability, standardization, opening*.

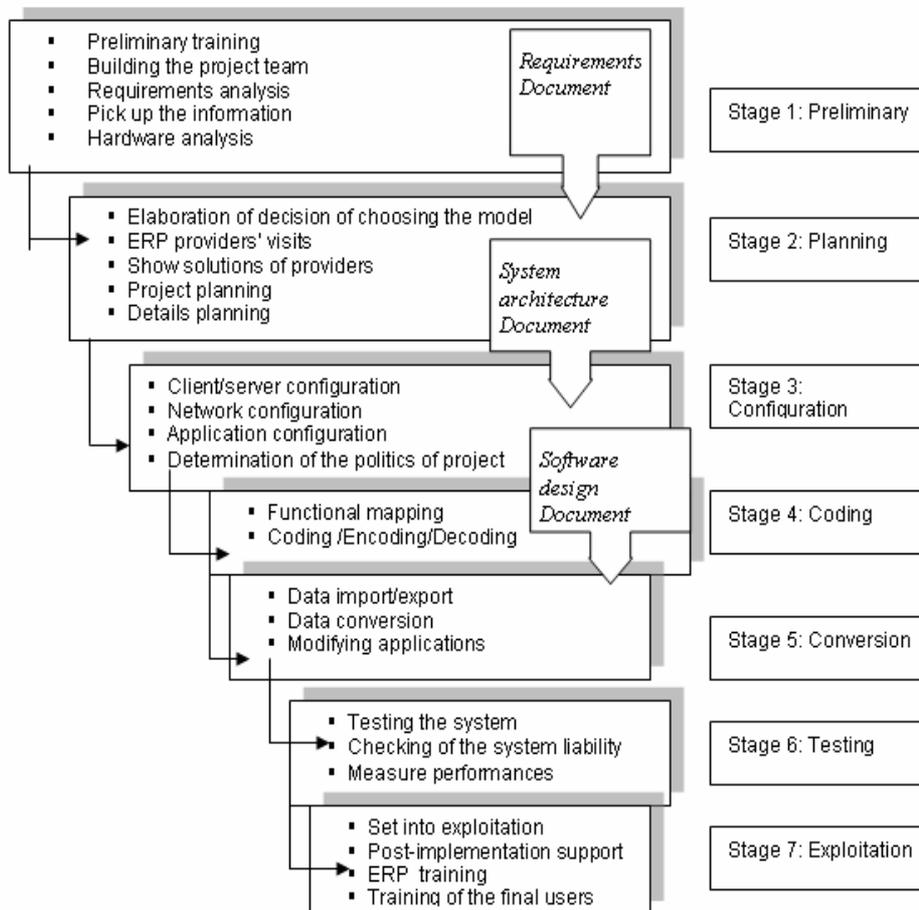
- The first step in the research was the study of the theoretical concepts about Modeling of Software Engineering, Methods of Software Modeling and Systems Engineering
- The collaboration with important software companies from Cluj – Napoca, help to keep the link between theoretical aspects and practical aspect of the proposed model;
- The synergetic aspects between ERP Systems, Software Engineering and Software Modeling and some mathematical methods of engineering were hard to study.

### **Results**

In this article we want to transpose the well – known models of Software Engineering in the designing and implementing of ERP systems. The steps implemented here are based on the steps generally used in implementing the ERP systems (as we can see in Anderegg. T., ERP:A-Z Implementer's guide for success, 2000, but without design or planning), but substantially improved with steps of Information Systems design.

### a. The Waterfall model

Figure 1. The Waterfall model implemented on ERP systems



The Waterfall model requires a systematically approach, sequential, of software development which start from the system and goes through stages as analysis, design, implementing, programming, testing and support. The model directs to the whole cycle of life of the product, there exist evaluations for each team and possibilities of return to stages or retake of the life cycle in a further evolution. The Waterfall model which is possible in ERP design is shown in figure 1.

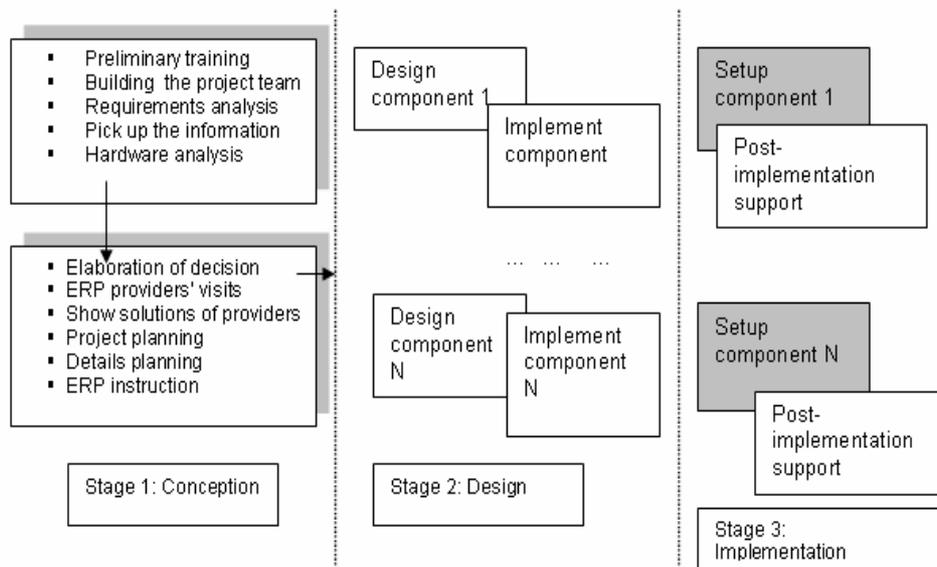
### b. The incremental model

The incremental model promotes the idea of independent design and achieve of components after definition of global architecture of Information Systems. Achieve and Design of Information Systems is made in accordance of top-down methods principles. The system may be delivered to the beneficiary and structured on stages when the components are ready, depending on the required priorities. In such an approach may appear difficulties in integration of components

in the final system. The incremental model which is possible in ERP design is shown in figure 2.

The first two stages are similar with the first two stages of the Waterfall model, but from the moment of define the architecture of Information System each component follow the own life cycle. Is offered the possibility of deliver the final Information System having all the components integrated. The incremental model which is possible in ERP design is shown in figure 2.

Figure 2. The incremental model implemented on ERP systems



### c. The Spiral model

The Spiral model is based on the idea of incremental improvement of sequential methodology. This model permits the feedback of each team in complexity or the rightness of the requirements. Exits stages in which may be correct the errors. The client may observe the result and may offer information mostly in the stage before launching the product. The development process may be better adapted on technological progress, as appear new solutions they can be integrate on the product architecture.

In this model we have four stages (as we see in figure 3.) described as follows.

#### Stage 1: Preliminary analysis

1. Objectives, alternatives, constrains
2. The conception of operations
3. The plan of business integration
4. The requirements and life cycle plan
5. The reference analysis
6. Objectives, alternatives, constrains
7. Risk analysis and prototype

Stage 2: Final analysis

8. Hardware dimension
9. Software requirements and validation
10. Simulation
11. Development plan
12. Objectives, alternatives, constrains
13. Risk analysis and prototype

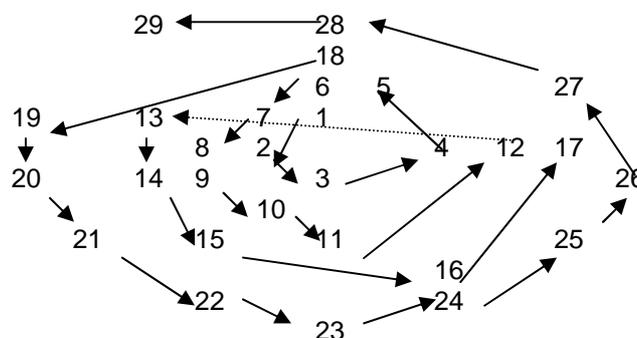
Stage 3: Design

14. Establishing of project policy
15. Functional mapping
16. Prototyping and testing
17. Validation and verifying
18. Objectives, alternatives, constrains
19. Risk analysis and operational prototype

Stage 4: Implementing and testing

20. Detail planning
21. ERP training
22. Applications configuration
23. Modify applications
24. Data conversion
25. Coding/Encoding/Decoding
26. Unit integration
27. Testing of acceptance
28. Launching the product
29. Post-implementation support

Figure 3. The spiral model implemented on ERP systems

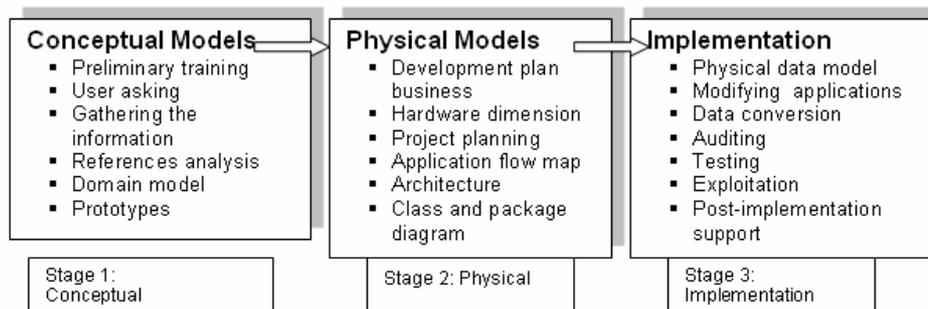


**d. Extreme Programming model**

This method considers that the development of programs does not mean hierarchies, responsibilities and deadlines, but the collaboration of people from which is structured the team. The people are encouraged to affirm their personality, to offer and receive knowledge. The client must be involved on all the development process. His role is to fix the priorities, requirements and evaluation of system iteration. The program is incremental developed; the client indicates the requirement which must be included at each iteration.

XP considers that program development means first of all programs writing, no documents, sessions or reports. The principal stages are shown in figure 4.

Figure 4. The XP model implemented on ERP systems



## Conclusions

The ERP systems acquired a special importance in present Information Systems. All the multinational companies (companies from *500 Fortune Top*) implemented an ERP, first of all in the idea of efficiency of activity, then fluidity, then to gain the strategically advantage on the marketplace. The development models implemented in ERP systems are very important especially at the beginning of implementation. As development models implemented in ERP systems we described here the Waterfall model, the Incremental model, the Spiral model and XP model, chosen by the authors and considered most important. Choosing of a developmental methodology must consider the nature of each project:

- The budget of each company;
- The size of developmental team;
- Used technology, hardware platform and infrastructure;
- The tools and methods wanted to be used;
- The deadlines;
- The existing processes.

As future direction of the research, the working group proposed some main research directions:

- Core database technology and methodology for ERP systems
- Infrastructure for information system development
- The investigation of the impact of ERP systems adoption on various measures of organizational performance.
- The development by profoundly levels of each methodology presented in this research paper.

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## AN INVESTIGATION OF CO-INTEGRATION AND GRANGER CAUSALITY BETWEEN TRADE OPENNESS AND ECONOMIC GROWTH IN PAKISTAN

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**Abstract.** This paper elucidates the causality between trade liberalization and economic growth in Pakistan using time series econometric analysis. There are many studies on the issues of exports, imports and economic growth but few have addressed the issue of trade liberalization in Pakistan. In this study, quarterly data covering the time period from 1975:1 to 2003:4 on exports, imports and gross domestic product (GDP) has been used for the empirical analysis. Trade openness is calculated using two distinct approaches. Real GDP is used as a proxy variable in the analysis. Time series analysis is carried out in terms of Augmented Dickey-Fuller test of stationarity, Engle-Granger co-integration test, error correction model and Granger causality test, for the empirical analysis of the relationship between trade openness and economic growth. According to the results, all variables are found non-stationer at level and can be co-integrated. Therefore, there exists a long term or equilibrium relationship between the trade openness and GDP growth rate. Finally, it is concluded that the policy of trade liberalization should be significantly executed for greater trade openness in order to accelerate GDP growth rate and consequently to alleviate poverty besides the improvement in some other important macroeconomic variables in the country.

**JEL Classification:** F43, F49, O47, O53, C22

**Keywords:** Trade Openness, Economic Growth, Co-integration, Granger Causality

### 1. Introduction

Trade liberalization is one of the significant variables of economic globalization and is most widely considered for economic and sustainable development in the world. Economic globalization is centered on the integration of international markets for goods, services, finance and to some extent labour. It is also usually driven by a push towards the liberalization of trade and investment regimes. Trade policies in developing countries have been at the centre stage of analysis for the past several decades. The desire for rapid economic growth in

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developing countries raised many questions about the relationship between trade and growth (Kruger, 1997).

The debate of the relationship between trade liberalization and economic growth remained controversial among policy makers and economists throughout the world. However, there is a great consensus that trade policy openness and higher ratios of trade volume to GDP were positively related with economic growth. Many developing countries are liberalizing their economies to become attractive destination for foreign capital inflows. Openness of trade regime can increase the investment and efficiency of investment and also can increase the market size in these countries.

A huge body of literature is available on the relationship of trade liberalization and economic growth in the world. Yanikkaya (2003) found positive relationship between openness and economic growth. He used trade volumes and trade restrictions as indicators of openness for a panel of 100 developed and developing countries. He also found that there is positive relationship between measures of trade barriers and economic growth in contrary to conventional wisdom. Milanovic (2003) also analyzed the impact of trade openness and foreign direct investment on relative income shares across the entire income distribution. He concluded, using the new data derived directly from household surveys, at low average income level, it is the rich who benefit from openness.

Sachs and Warner (1995) examined the links between openness and economic growth for 79 countries for the period 1970-1989. They concluded that openness is binary variable and significant determinant of economic growth. Later on their work was re-examined by Wacziarg and Welch (2003). They also presented an updated dataset of openness indicators and trade liberalization dates for a wide cross-section of countries in the 1990's. They found that liberalization has, on average, robust positive effects on growth, openness and investment rates within the countries.

Now we come to the significant attempts that have been made to analyze the relationship between trade and economic growth in Pakistan. Khan and Saqib (1993), using simultaneous equation model, found robust relationship between exports growth and economic growth in Pakistan. Khan (1998) examined trade liberalization measures taken by the government of Pakistan during fifty years. Pakistan's export performance has been lackluster at best as compared to other developing countries. He concluded that despite trade liberalization over the years in Pakistan, policy regime has been biased against exports relative to the sale in home market. Ahmed, et al. (2000) investigated the relationship between exports, economic growth and foreign debt for Bangladesh, India, Pakistan, Sri Lanka and four South East Asian countries using a trivariate causality framework. The study rejected the export-led growth hypothesis for all countries (except Bangladesh) included in the sample. Kemal, et al. (2002) investigate export-led hypothesis for five South Asian Countries including Pakistan. The study found no evidence of causation in the short-run for Pakistan in either direction. However, they found a strong support for long-run causality from export to GDP for Pakistan. Quddus and Saeed (2005) showed a positive relationship between exports and growth based on the time series analysis. The estimates revealed that growth rate of exports; labour force and investment have significant bearing towards GDP growth in Pakistan. Nevertheless there are many studies on the relationship between trade and growth but least on the openness and economic growth in Pakistan.

The main objective of the paper is to analyze the empirical impact of trade liberalization on economic growth in Pakistan using quarterly data. The present study is organized as follows. Section II describes the experience of Pakistan in terms of trade liberalization and economic growth. Section III deals the issues of data sources and its limitations. Methodological issues are discussed in section IV. The results of the empirical analysis have been described in section V. Section VI concludes the study.

## **2. Trade Liberalization and Economic Growth: The Experience of Pakistan**

Pakistan had inherently very poor industrial base consisting of few textile mills and some cement factories but more agricultural resources. Pakistan adopted import substitution policy during early years of independence to protect the local industry. The extent of protection was very large during 50's. However, during 60's this protection was minimized. Pakistan promoted its exports and also liberalized its imports during this period. The main emphasis was to shift away from direct controls to indirect controls on imported and domestic goods. Pakistan performed very well in terms of manufactured exports than other countries like South Korea, Turkey, Thailand and Indonesia. The decade of seventies brought some changes in trade policy of Pakistan. Export bonus scheme was eliminated with devaluation of 57% and licensing system was also curtailed. So, overall trade and industrial policies remained against exports during the 1970's. Some important steps were taken to liberalize and to encourage the foreign trade during 1980's. Some measures were also taken to boost exports during this decade. In spite of these measures, trade regime remained protective and discrimination against exports continue during this period. Macroeconomic Structural Adjustment program was launched at the end of 80's. Tariff rates were decreased for a total of 1134 items and increased for 462 items. More or less Pakistan achieved neutral trade regime during 1990's. Pakistan has liberalized its economy and much concentrated on foreign trade during last six years. Trade volume is increasing at a great pace and touching its peak from last three years.

Figure 1 shows the historical trends in total volume in foreign trade in Pakistan during the period under study. There is no significant increase in foreign trade in Pakistan up to the 1990. Although some steps were taken to liberalize the economy during 80's. At the end of eighties, a comprehensive program of macroeconomic adjustment and structural reform was embarked. But in spite of these reforms, last decade of twentieth century showed fluctuations in trends of foreign trade in Pakistan as indicated by figure 1. After 2000, there is significant increase in total volume of trade because the present government is very much determined to liberalize the economy in spite of the fact that trade deficit is increasing with a great pace which should also be undertaken.

Trends in trade openness (measured by Imports + Exports/GDP) have been shown in figure 2. It is a poor picture of trade openness in Pakistan. Pakistan witnessed fluctuations in ratio of trade to GDP throughout our sample period. It touched the highest figure of 0.37 in 1993. It remained fluctuated from 0.25 to 0.37 throughout the period of study which show poor performance in terms of trade liberalization in Pakistan.

Figure 1. Total Volume of Trade in Pakistan (1975-2005)

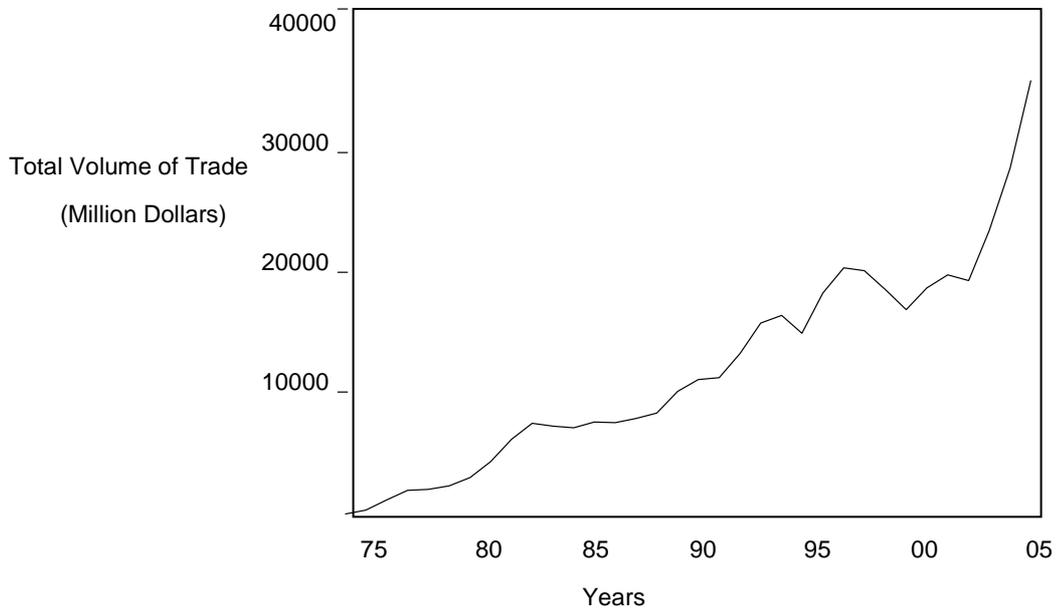
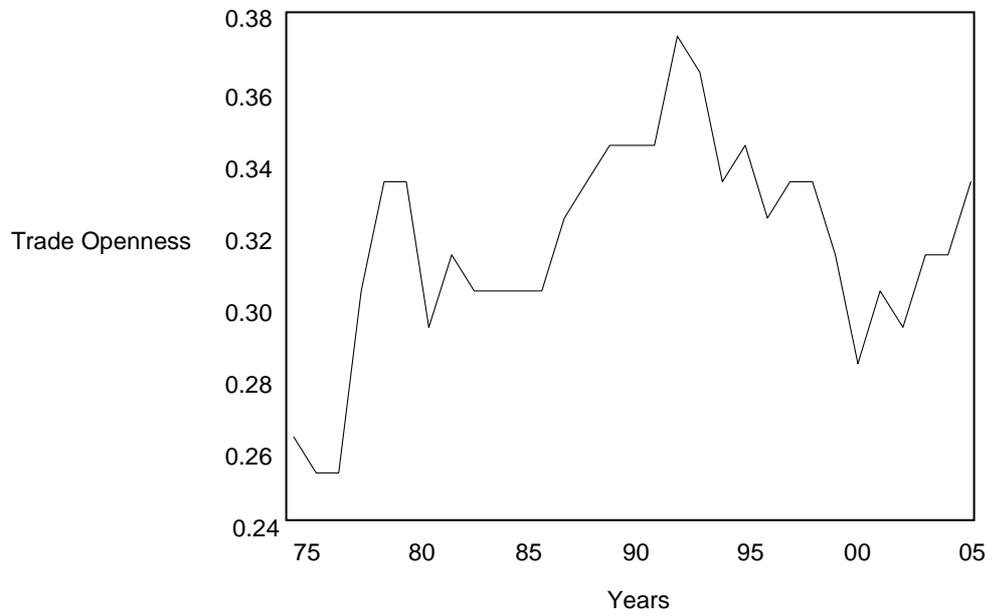
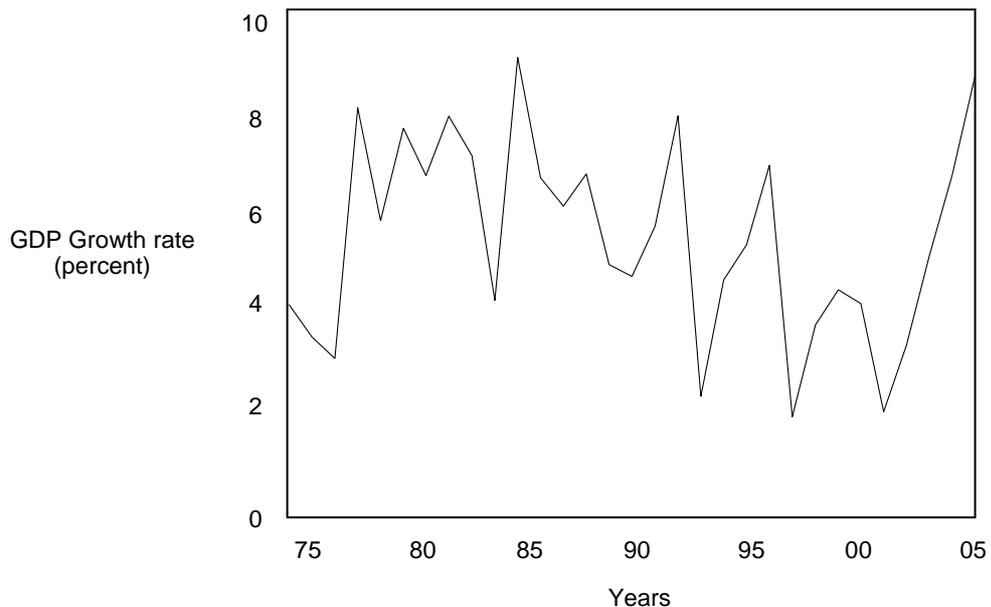


Figure 2. Trends in Trade Openness in Pakistan (1975-2005)



Pakistan witnessed uneven growth pattern during most of period in its history. The average growth rate is about 5.2 during our sample period. It is fluctuated from 2 to 8 percent up to 2001. After 2001, there is significant and continuous increase in growth rate of Pakistan as indicated by figure 3.

Figure 3. Trends in GDP Growth Rate in Pakistan (1975-2005)



### 3. Data Sources and Description of Variables

In this paper we have used time series quarterly data covering the period from 1975:1 to 2003:4 to explore the relationship between trade liberalization and economic growth in the context of Pakistan. The quarterly data on gross domestic product (GDP) is obtained from statistical papers series no. 5 prepared by Kemal and Arby (2004). The data on exports and imports is taken from international financial statistics (IFS) up to 1998 and from 1998 to 2003 is obtained Statistical Bulletin of Government of Pakistan, Finance Division on quarterly basis. The exports and imports are taken on unit values with common base of 1995. The real values of all variables are calculated using the consumer price indices with the common base of 1995. The real GDP is used as a proxy variable for economic growth. Trade openness and trade volume are calculated as real exports plus real imports divided by the real GDP and real exports plus real imports respectively in this study.

Before proceeding further, it is also necessary to point out some limitations related with the data. First, Real Gross Domestic Product has been taken as proxy for economic growth instead of GDP growth rate. Secondly, quarterly data has been used instead of annual data set. The names of relevant variables and their description are given below.

Variable's Name	Description
GDP	Real Gross Domestic Product
OPEN	Trade Openness Measured by (Real Exports + Real Imports) / Real GDP
TRADE	Total Volume of Trade Measured by (Real Exports + Real Imports)
LGDP	Log of Real GDP
LOPEN	Log of Trade Openness
LTRADE	Log of Total Volume of Trade

#### 4. Methodological Issues

To empirically analyze the relationship between trade liberalization and economic growth, time series econometric approach has been carried out. Unit root test has been employed to check the stationarity of the concerned variables. In this context, Augmented Dickey-Fuller test has been used. The test has been performed at level as well as at 1<sup>st</sup> difference with intercept and with trend and intercept both. Remember that ADF test is modification of the Dickey-Fuller (DF) test and lagged values of the dependent variables are added in the estimation. ADF test is based on the following model:

$$\Delta Y_t = \alpha + \beta T + (\rho - 1)Y_{t-1} + \delta \Delta Y_{t-1} + e_t \quad (1)$$

ADF test adjusts the DF test to take care of possible serial correlation in the error terms by adding the lagged difference of the dependent variable.

The co-integration between the series is also tested by conducting ADF test on residuals. When error terms (residuals) are found to be integrated of order zero (if these are stationary at level), I (0), and then it can be concluded that these two series are co-integrated and a stable long-run relationship exists between trade liberalization and economic growth.. These are the equations based on our hypothesis:

$$GDP = \alpha + \beta OPEN + \varepsilon_{1t} \quad (2)$$

$$GDP = \alpha + \beta TRADE + \varepsilon_{2t} \quad (3)$$

$$LGDP = \alpha + \beta LOPEN + \varepsilon_{3t} \quad (4)$$

$$LGDP = \alpha + \beta LTRADE + \varepsilon_{4t} \quad (5)$$

If the variables are going to be co-integrated, long-run relationship can be taken into account. We include the error term as explanatory variable in the given equations; the model will take the form:

$$\Delta Y_t = \beta_0 + \beta_1 \Delta X_t + \beta_2 \varepsilon_{t-1} + \mu_t \quad (6)$$

In equation (6),  $\varepsilon_{t-1}$  is an error correction term representing the long-run relationship. A significant coefficient indicates the presence of long-run causal relationship.

Furthermore, to check the linear causation between the concerned variables, Granger Causality test has been performed. Granger Causality helps in

determining the direction of the relationship. The test is based on the following model:

$$Y_t = \beta_0 + \sum \beta_j Y_{t-j} + \sum \delta_j X_{t-j} + \mu_t \quad (7)$$

We can say X Granger Cause Y if current values of Y are determined by past values of X. The test of  $H_0 : \delta_j = 0$  can be carried out with an F test. Moreover, the number of lags can be determined by using AIC, adjusted  $R^2$  or highest feasible number of lags can be included.  $\sum \delta_j$  represents a short-run effect of  $X_i$  while the long-run effect is  $\sum \delta_j / (1 - \sum \beta_j)$ .

## 5. Empirical Results and Discussion

In this study, we have employed the Augmented Dickey-Fuller test to estimate the unit root on all time series variables. This test has been employed at level as well as at 1<sup>st</sup> difference with intercept and with trend and intercept. This test has also been employed in the log form of the variables. The test implies that variables are found stationer at 1<sup>st</sup> difference with intercept and with trend and intercept. All the time series are not found stationary at level even at 10% level of significance.

Table 1: Augmented Dickey-Fuller Test with Intercept

Variables	Level	1 <sup>st</sup> Difference	Conclusion
GDP	1.44	-8.63	I(1)
OPEN	-0.57	-5.44	I(1)
TRADE	-1.13	-5.04	I(1)

Source: Authors' calculations based on E-views software.

Table 2. Augmented Dickey-Fuller Test with Trend and Intercept

Variables	Level	1 <sup>st</sup> Difference	Conclusion
GDP	-2.73	8.80	I(1)
OPEN	-3.13	-5.44	I(1)
TRADE	-2.86	-5.02	I(1)

Source: Authors' calculations based on E-views software.

The test is also performed with log form of the variables with intercept and with trend and intercept both. This also reveals the same results that variables are integrated of order one i.e. I(1).

Table 3: Augmented Dickey-Fuller Test with Intercept Using Log form of Variables

Variables	Level	1 <sup>st</sup> Difference	Conclusion
LGDP	-2.48	-8.65	I(1)
LOPEN	-0.77	-5.94	I(1)
LTRADE	-1.47	6.05	I(1)

Source: Authors' calculations based on E-views software.

Table 4. Augmented Dickey-Fuller Test with Trend and Intercept Using Log form of Variables

Variables	Level	1 <sup>st</sup> Difference	Conclusion
LGDP	-0.70	-8.97	I(1)

LOPEN	-1.96	-5.91	I(1)
LTRADE	-1.95	-6.11	I(1)

Source: Authors' calculations based on E-views software.

We have found the same integrating order of the variables as indicated by the previous tables. To check the existence of co-integration analysis, ADF test for residuals of the equations mentioned in the methodology has been performed in table 5. It implies that error terms of the equation (2) and (4) are integrated of order zero i.e. I(0). So, equation (2) and (4) can be tested using Error Correction Model (ECM) and Granger Causality test.

Table 5. ADF test for Residuals

Error Terms	Level	Conclusion
Residual of Equation (2)	-3.26	I(0)
Residual of Equation (3)	-2.55	I(1)
Residual of Equation (4)	-3.40	I(0)
Residual of Equation (5)	-2.65	I(1)

Source: Authors' calculations based on E-views software.

Error correction model of equation (2) has been performed in table 6. The results imply that there is long-run relationship between OPEN and GDP. The t value of error term of the equation is significant at 1% level of significant. This shows the strong evidence of long-run relationship between trade openness and real GDP. Similarly, error correction model of equation (4) has also been performed in table 7 which indicates the strong long-run relationship between LOPEN and LGDP. The t value of the error term in this table is also significant at 1% level.

Table 6. Error Correction Model of Equation (2)

Dependent Variable: D(GDP)			
Method: OLS			
Sample: 1975:1-2003:4			
Variables	Coefficients	Standard Error	t-statistics
Constant	9.831313	14.58065	0.674271
D(OPEN)	0.043	0.1248974	3.452128*
Error Term (-1)	-0.376102	0.075396	-4.98883*
R-squared	0.340649	F-statistics	14.6757*
Adjusted R-squared	0.335600	Probability (F-statistics)	0.0004
Durbin-Watson statistic	2.097065		

Source: Authors' calculations based on E-views (computer software).

Note: \*, \*\* and \*\*\* indicate the level of significance at 1%, 5% and 10%, respectively.

Table 7. Error Correction Model of Equation (4)

Dependent Variable: LGDP			
Method: OLS			
Sample: 1975:1-2003:4			
Variables	Coefficients	Standard Error	t-statistics
Constant	0.008896	0.0117833	0.75492
D(LOPEN)	0.210893	0.49118	4.29357*
Error Term (-1)	0.636912	0.082423	-7.72632*
R-squared	0.376197	F-statistics	33.77189*
Adjusted R-squared	0.365057	Probability (F-statistics)	0.0000
Durbin-Watson stat.	2.012126		

Source: Authors' calculations based on E-views (computer software).

Note: \*, \*\* and \*\*\* indicate the level of significance at 1%, 5% and 10%, respectively.

The results of Granger causality test on equation (2) have been reported in table 8. The coefficient on OPEN(-1) is significant at the 1% level. We conclude that OPEN causes GDP. Nevertheless we can verify the impact of trade openness on economic growth. Granger causality test on equation (4) has also been performed in table 9. This also the reveals the same result that LOPEN cause LGDP because t value of the LOPEN(-1) is significant at 1%.

Table 8. Granger Causality Test of Equation (2)

Variables	Coefficient	Standard Error
Constant	2296.147	1223.810
D(OPEN)	3.956172	11.60769*
D(GDP-1)	-0.506865	0.084175
D(OPEN-1)	-33.89498	10.94376*
Error Term (-1)	-0.173964	0.07438
R-squared	0.469003	F-statistics 24.06858*
Adjusted R-squared	0.449517	Probability (F-statistics) 0.0000
Durbin-Watson statistic	2.139137	

Source: Authors' calculations based on E-views (computer software).

Note: \*, \*\* and \*\*\* indicate the level of significance at 1%, 5% and 10%, respectively.

Table 9: Granger Causality Test of Equation (4)

Variables	Coefficient	Standard Error
Constant	0.022977	2.461094
D(LOPEN-1)	-0.150938	-3.52111*
D(LGDP-1)	-0.505179	-7.187608*
Error Term (-1)	-0.378375	-4.693349*
R-squared	0.600795	F-statistics 55.18247*
Adjusted R-squared	0.589907	Probability (F-statistics) 0.000000
Durbin-Watson statistic	1.983390	

Source: Authors' calculations based on E-views (computer software).

Note: \*, \*\* and \*\*\* indicate the level of significance at 1%, 5% and 10%, respectively.

## 6. Concluding Remarks

The major objective of the paper is to examine the causal empirical relationship between trade liberalization and economic growth for the period 1975:1-2005:4 in Pakistan using time series econometrics. Over the period 1950-1998, countries that have liberalized their trade regimes have experienced, on average, increases in their annual rates of growth on the order of 1.5 percentage points compared to pre-liberalization times. Despite the intensive trade liberalization, Pakistan's trade performance is not satisfactory. Growth in exports remained slow, while the degree of openness in terms of trade as percent of GDP declined after the trade liberalization in Pakistan. It may be due to the fact that foreign direct investment (FDI), which is a complementary requirement for trade liberalization to be successful for promotion of exports, did not increase sufficiently.

We have applied unit root test on the time series variables and found all variables stationer at first difference. The variables are being co-integrated based on the significant results of unit root test on residuals of the equations. The study

also estimated the error correction model to explore the long-run relationship between trade openness and economic growth. The empirical results suggest that there is also long-run relationship between trade openness and economic growth in Pakistan. The association between these variables found robust in our analysis. Since the two series are co-integrated, the correct procedure would be Granger Causality in an error correction model. Granger Causality test implies that trade liberalization significantly causes the economic growth of Pakistan in long-run.

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