CONTRIBUTIONS OF EXPORTS OF SERVICES TOWARDS FIJI'S OUTPUT

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ABSTRACT

This paper uses the Solow Model (1956) to explore quantitatively the nexus between the level of output and the export of services, focusing particularly on the Fijian economy. The introduction comprehensively outlines the World Trade Organizations (WTO) General Agreement on Trade in Services (GATS), which was included in the Uruguay Round of trade negotiations incorporating services into the multilateral trading system under the GATS in January 1995 thus establishing the rules and disciplines governing trade in services in a multilateral framework. This paper uses two-time series method viz., the LSE/Hendry general to specific (known as GETS) and Engle Granger two step (EG) approach to report the relationship between services export and GDP for the period 1975-2003. The statistical analysis show that service exports have a positive impact both in the short run and long run on the output level in Fiji.
1. Introduction

In the past international trading system was seen as being primarily concerned with trade in goods. The focus of attention of the General Agreement on Tariffs and Trade (GATT) and later the World Trade Organization (WTO) was mainly about trade in goods. While trade in goods is at the forefront of the trade agenda of most countries, more recently international trade in services has also attracted a lot attention. In global terms, trade in services is much smaller than trade in goods, but it is seen as being increasingly important because of its increasing contribution towards Gross Domestic Product (GDP). For some countries the importance of services relative to goods is much higher because the growth in service exports is very much higher than in goods exports. Attempts to provide the same sort of policy framework as that prevailing for goods led to the proposal of the General Agreement for Trade in Services (GATS) hereafter as GATS, which itself is an important component of the Doha Development Agenda, which addresses the question of how to encourage sustained economic development in developing and least-developed countries.

GATS is one of more than 20 agreements administered and enforced by the World Trade Organization (WTO), which establishes a multilateral framework of principles and rules for all forms of trade in all services, a large and fast-growing segment of world trade (Guttal, 2001). It also sets in motion, a process for the progressive removal of restrictions on international services trade. According to WTO, GATS will create a credible and reliable system of international trade rules; ensuring fair and equitable treatment of all participants (principle of non-discrimination); stimulating economic activity through guaranteed policy bindings; and promoting trade and development through progressive liberalization. GATS is being promoted as a "bottom-up" treaty rather than a "top-down" treaty since it allows governments to make commitments for trade liberalisation in different sectors where governments can supposedly choose the sectors they want to start opening up. GATS is designed to ensure that the laws and regulations that WTO member governments apply to services trade are transparent and fair. Its key market-opening
element is the Schedule of Specific Commitments that each signatory annexed to the GATS as an integral part of the Agreement.

The GATS' contribution to world services trade rests on two main pillars: (a) ensuring increased transparency and predictability of relevant rules and regulations and (b) promoting progressive liberalization through successive rounds of negotiations. Within the framework of the Agreement, the latter concept is tantamount to improving market access and extending national treatment to foreign services and service suppliers across an increasing range of sectors (GATS, 2006). The GATS classifies services trade into four different modes known as “modes of supply”:

(1) cross-border supply of a service (that is, not requiring the physical movement of supplier or consumer); (2) Provision implying movement of the consumer to the location of the supplier; (3) Services sold in the territory of a member by (legal) entities that have established a presence there but originate in the territory of another member; and (4) Provision of services requiring the temporary movement of natural persons (service suppliers or persons employed by a service supplier who is a national of a country that is a party to the agreement).

The world economy has fast turned into a ‘service economy’ since the 1990s. Services revolution across the globe has changed the business map and the way business is conducted. Rapid growth of services sector has outstripped the growth in real GDP in a number of economies from Asia. While developed countries still account for the lion’s share of services in world GDP and trade, developing countries have recently started to carve out an increasingly larger share of the pie for themselves. The share of services in GDP is about 70 percent in high-income OECD countries and as low as 26 percent in some low-income economies. Over the last decade, international trade in services has been growing at a somewhat higher rate than trade in goods, even though services constitute only about a fourth of total (goods and services) international trade; between 1990 and 2000, global exports of services registered a growth of over 7% as compared to a growth rate of 6% in goods. Rapid advancement in technology and innovations (especially in communication, transportation, and information processing) accompanied
by an increased integration of financial markets have increased the tradability of services, which has further facilitated the expansion of cross border trade in services (Karmakar, 2005: 1).

According to the WTO (2001), the liberalization of services is seen as important because it is impossible for any country to prosper today under the burden of an inefficient and expensive services infrastructure. The benefits of services liberalization extend far beyond the service industries themselves; they are felt through their effects on all other economic activities. In total altogether six benefits are expected and can arise for countries pursuing service liberalization in areas such as; economic performance, development, consumer savings, faster innovation, greater transparency and predictability and technology transfer.

The purpose of the paper is to explore quantitatively the nexus between the level of output and exports of services as an engine of growth in Fiji with particular emphasis on the WTO’s General Agreement on Trade in Services (GATS). A basic neoclassical Cobb-Douglas production function is argumented with a shift variable like exports of services. The approach is similar to what Rao, Singh and Nisha (2006) used where they extended the neo-classical growth model to estimate the growth effects of human capital and recently Rao and Takirua (2006) analysed the significance of the exports, remittances and aid beside capital and labour for determination of output in Kiribati with the use of the Solow (1956) model and its extensions. Although few alternative approaches can be used to estimate the cointegrating equations, only Engle Granger two step and the LSE/Hendry general to specific approaches (GETS) are used to test this nexus because they are simple and easy to implement. Further both give close results for the data, which is used.

The balance of this paper is organized as follows. Section two provides an overview of the Fijian economy and the contribution of services to the Fiji Economy. Section 3, is a survey of literature presenting theoretical background on the GATS agreement mostly with Asian country experiences. Unit root test results are in section 4. In Section 5 and 6 respectively, the specification and empirical results of the estimated equations are discussed for Fiji and the final section provides summary and conclusion.
2. **Services Sector in Fiji and its Contribution to the Economy**

Services trade, especially tourism, plays an important role in Fiji’s external accounts. Fiji’s broad categories and sub-sectors of international trade in services are listed in Appendix-B, but Fiji’s Schedule of Specific Commitments under the General Agreement on Trade in Services (GATS) includes tourism and travel-related services covering hotels, motels, other tourist accommodation and restaurants which constitutes to the mode 2 of GATS agreement. In these areas, Fiji has bound itself not to limit market access or national treatment for cross-border supply, consumption abroad and commercial presence, although there are some limitations on commercial presence in market access. Fiji did not participate in the WTO negotiations on basic telecommunications and maritime transport.

Even though it is extremely difficult for Fiji to implement its current obligations under the WTO Agreement, Fiji is in the midst of implementing its Specific Commitments under GATS. The tourism sector is Fiji’s single largest service export earner accounting for about 20 per cent of GDP. The May 2000 crisis resulted in tourism visitor arrival levels plummeting from a record high of 409,000 in 1999, to a low of 249,000. However, the industry recovered strongly with visitor arrivals recorded at 348,000 for 2001. "Tourism in 2001 was 26 percent of Fiji's GDP". In 2002, tourism contributed over $521 million FJD from over 400,000 visitors (World Investment News). While Australia and New Zealand are Fiji’s traditional source markets, the Fiji Visitor’s Bureau is also running promotions in North America and Europe and now wants to extend its work into Asia (India and China particularly) and South America. The industry has been striking double-digit growths in visitor arrivals for two consecutive years now and therefore the government is committed to further developing the sector and tapping its potential to the Fullest extent possible. Gross earnings have surpassed the half-a-billion dollar mark. The industry now sets its goal of making tourism a one billion dollar industry by 2007. The Fiji government's National Economic Summit in 2002 heard. "By 2007, tourism has the potential to exceed $1 billion. The tourism service sector alone is responsible for the direct and indirect employment of some 45,000 Fiji Islanders."
Fiji’s trade in total services has generally shown an upward trend during the period 2003-2004, this is largely due to improvements in services trade in the transport and travel sector. Over the last three years, the transport sector has had the largest share in total trade in services, with an average share of around 38%. This has been closely followed by the travel sector, with an average share of about 36%. Services receipts, particularly from tourism, have largely offset Fiji’s historical trade deficit. The balance of payments has been in near balance, with reserves relatively stable at well over four months of imports since 1993.

Major constraints associated with the tourism service sector include political instability, shortage of upmarket accommodation in relatively busy periods, problems related to land issues, airline capacity and recession in major source markets, the pollution and degradation of our natural environment and development and training to improve workers’ skills (Fiji’s strategic Development Plan: 2003 – 2005). Fiji became a member of the WTO in January 1996 and under the General Agreement on Trade in Services (GATS), Fiji has scheduled commitments in tourism and thus recognizes the importance of having in place an efficient services sector for the development of its exports and implementation of its trade policies therefore government policy continues to emphasise private-sector participation and performance and is addressing issues, such as, air access, the structure of accommodation, expanding the tourism product, promoting Fiji in new and existing markets, and providing trained workers to meet the changing human-resource needs.
During the period 1975-2003, exports of services from Fiji generally showed an upward trend (Figure 1). Notable declines in exports of services were only seen in 1987 and 1998. The decline in 1987 was generally due to the political instability in that year, which adversely affected our tourism receipts. The fall in 1998 maybe due to the devaluation of Fijian currency, which would have raised the import bills and instigated the fears of non-confidence in the country, thus may have led to fall in tourist numbers and overall decline in the export of services in this period.

3. Literature Review

Over the past decade, several descriptive studies on trade in services have been carried out across the globe. Since the GATS agreement is in the midst of its implementation in all WTO member countries, there is absence of empirical literature on exports of services due to the difficulties arising from poor information on international services transactions as well as from the necessity of developing a different modelling structure than that used

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1 Source data for figure 1 is IMF International Financial Statistic
for goods trade in order to incorporate the various modes of services supply. Despite the shortcomings the following paragraphs summarize some of these studies.

In a study on exports of services and economic growth in developing countries, Gabriele (2004) illustrated the main trends in international trade in services during the last two decades of the last century, and explored quantitatively the nexus between GDP growth and exports of services, focusing particularly on the role of developing and transition countries. The descriptive statistical analysis exhibited that services exports have been the most dynamic component of world trade and that the world market share of developing countries has been on the rise. The growth rate of services exports from developing countries slowed down, and their ability to import services also declined, with a negative impact on their development perspectives.

This paper also focused on the main exporters in each of the services sub-sectors among developing and transition countries most of them are either large semi-industrialized Asian countries or European transition countries that have achieved high level of industrial and technological development with respect to the rest of the non-developed world. The correlation analysis in this study showed that, in the long run, services exports do have a positive impact on GDP growth in developing countries. Yet, for developing countries the services exports/GDP growth nexus is weaker than in the case of developed countries. Moreover, in most developing regions, the growth-enhancing impact of exports as a whole appears to have declined in the 1990s, although this decline appears to be due more to the merchandise component of exports than to the services component.

Given the growing significance of the services sector in India, a study by Banga (2005) identified some of the critical issues in India’s service-led growth and provided policy insights with respect to them. The critical issues identified are: (1) what explains growth of service sector in India; (2) what are the reasons for lack of corresponding growth in employment in the service sector; (3) can service sector sustain its growth; and (4) what are the external and domestic constraints to trade in different services. An assessment of performance of services at the aggregated as well as the disaggregated level is undertaken in terms of their shares in GDP, employment, trade and FDI. In order to identify external
and domestic constraints to trade, services have been categorized according to their extent of liberalization, growth and share in trade. The paper discusses the policy directions that emerge from the analysis.

Francois & Eschenbach (2005), have explored dynamic linkages between financial/banking sector openness, financial sector competition, and growth in a model highlighting links between long-run economic performance and services trade, through scale economies and market and cost structures in the financial services sector and followed by empirics based on data for 130 countries for the 1990s. This paper examines the pro-competitive effects of trade in financial services highlighting the role of financial services at the nexus of the savings and accumulation mechanism that drives economic growth by using a National GDP function that is Cobb-Douglas. To handle the unbalanced nature of missing observations in the system, they included an estimator – partial sample overlap least squares – that lets them use the full sample. Results point to a strong positive relationship between financial sector competition/performance and financial sector openness (meaning foreign bank access to domestic markets), and between growth and financial sector competition/performance. They also point to the presence of scale economies in the sector.

Robinson et al. (1999) explore the impact of changes in trade in services, including changes in technology and protection, as well as the potential empirical importance of technological externalities that are transmitted through trade in services, intermediate inputs, and capital goods. They find that liberalisation in services trade, i.e. a 50 percent cut in services protection, would improve the welfare of all participating countries, accounting for a global gain for the world of 1.05 percent from the global base year GDP. Interestingly, the authors find that the welfare gain for the world as a whole from a 50 percent cut of protection in the services sectors is five times larger than that from non-services sectors trade liberalisation. A 100 percent elimination of protection in all manufacturing sectors generates a smaller gain in real GDP than a 50 percent cut in the protection level of services sectors. When productivity gains from importembodied technology via services inputs are also considered, welfare increases substantially. The total factor productivity (TFP) growth from liberalisation in the services sector is
potentially very significant, more than doubling the welfare gains, in some cases reaching even higher values, especially for developing countries.

Economy-wide modeling conducted under the auspices of the Centre for International Economics in Canberra using the GTAP ((Global Trade Analysis Project) framework and results reported in a study edited by the Australian Department for Foreign Affairs and Trade (1999) estimates over US$ 400 billion global gains from halving goods and services barriers. Services would contribute, with US$ 250 billion, to over 60 percent of the total liberalisation gains. Liberalisation is expected to result in such large welfare gains because of the substantial scope for productivity improvements in the services sector. The studies indicate that generally, economies with initial high protection levels tend to gain most (in terms of percentage gains to GDP). As the values of estimates for services trade barriers are higher for developing countries than for developed countries, it suggests that the potentially major winners are the developing economies.

Kox and Lejour (2005) explain that service providers often experience obstacles when they want to export their services to other countries. To a certain degree, such trade barriers result from national regulations for service firms or service products. This affects service firms more than manufacturing firms, because the service provider often has to provide his services close to the foreign consumer. Foreign Service providers are confronted by national regulations such as requirements for additional professional qualifications, local residence of management, additional professional insurance, and constraints on the use of inputs from their origin country. Kox and Lejour show in a formal model that policy heterogeneity negatively affects the level of bilateral services trade.

In order to test this model, the authors developed a new index of bilateral policy heterogeneity between countries, based on detailed pair-wise country comparisons with respect to a large number of regulation items that affect service markets. The heterogeneity index is also decomposed for five different policy areas (barriers to competition; administrative barriers for start-ups; regulatory and administrative opacity; explicit barriers to trade and investment; and state control). The disaggregation makes it
possible to test in which policy areas the international regulatory heterogeneity has its largest trade impacts.

The hypotheses were tested empirically with regard to service trade among EU countries. The level of bilateral trade in commercial services is explained in a gravity model that apart from the policy heterogeneity indices uses the following explanatory variables: GDP in the country of origin and destination (indicator for market size and scale effects), indicators for physical and language distance between countries (representing variable trade costs), OECD indicators for relative regulatory intensity of countries. The empirical results are in line with our hypotheses. A high level of policy heterogeneity between two countries has a significant negative effect on bilateral service trade. The results prove to be robust for various specifications and estimation methods.

These results are important from a policy perspective. Reducing the trade-hampering effects of international regulatory heterogeneity can be done in two ways: harmonizing regulations or applying mutual recognition of (foreign) regulatory standards. The second form requires much less coordination and could perhaps be more easily achieved. Under mutual recognition, foreign firms may operate in an export market if they comply with regulatory standards in their origin country. It reduces the fixed market-entry costs in export markets. It would generate more trade participation of small- and medium-sized firms, while larger firms may get more scope for exploiting scale-related efficiency gains.

The results of this study have been used for simulations of recent EU proposals that allow for more mutual recognition of regulatory standards in European services markets. A key element in these proposals is the 'country of origin' principle: a service provider that meets the standards set by regulation in his country of origin may no longer be confronted by additional regulation in the EU country where the service is delivered. Using our earlier empirical results we performed simulations on the basis of the recent EU proposals. The simulations show that full implementation of these measures could have a very powerful impact on trade: an increase in intra-European commercial services trade by 30% to 60%.
4. Unit Roots

The unit root test is carried to test whether the variables selected are stationary or not. A popular augmented Dickey Fuller (ADF) test for unit root is used to test for unit root in the levels of the variables and in their first difference. The variables are said to be \( I(1) \) in their levels and \( I(0) \) in their first difference. Unit root test in the logs of our variables viz., output (\( \ln Y \)), capital (\( \ln K \)), labour (\( \ln L \)) and export of services (\( \ln X_s \)) is carried out. The test indicates that all the variables tested are found to be unit root in levels and stationary in their first difference. The null hypothesis of unit root is rejected in first difference of all variables. The test results are in table-3 below. Therefore it is now plausible to apply cointegrating techniques to estimate long run output equation and thus the short run dynamics relationship based on the error correction model (ECM). Since GETS and EG give close results this two methods will be employed to examine whether export of services has any effect on the level of output besides the two conditioning variables capital and labour for determination of output in Fiji.

Table 1: Unit Root Tests

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>ADF</th>
<th>ADF</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \ln Y )</td>
<td>-2.567</td>
<td>( \Delta \ln Y )</td>
</tr>
<tr>
<td></td>
<td>(-3.57)</td>
<td></td>
</tr>
<tr>
<td>( \ln K )</td>
<td>-3.304</td>
<td>( \Delta \ln K )</td>
</tr>
<tr>
<td></td>
<td>(-3.57)</td>
<td></td>
</tr>
<tr>
<td>( \ln L )</td>
<td>-2.923</td>
<td>( \Delta \ln L )</td>
</tr>
<tr>
<td></td>
<td>(-3.57)</td>
<td></td>
</tr>
<tr>
<td>( \ln X_s )</td>
<td>-2.050</td>
<td>( \Delta \ln X_s )</td>
</tr>
<tr>
<td></td>
<td>(-3.57)</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. The ADF is the usual argumented Dickey- Fuller test.
2. The first column is for the levels of the variables and the adjacent column is for the first difference.
3. Figures in brackets are the 5% level critical values.
4. The sample periods are (1975-2003) for the levels and (1976-2003) for the first difference.
5. Tests for the levels of the variables intercept and trend are included, but excluded in the tests for their first differences. The null hypothesis in ADF is that the variable contains a unit root.
5. Specification of the Model

The basic Cobb-Douglas production function with constant returns to scale and Hick’s neutral technical progress to be estimated for the time series data to determine the level of output for Fiji is:

\[
Y_t = A_t K_t^\alpha L_t^{1-\alpha}
\]

\[
= A_0 e^{\varphi t} K_t^\alpha L_t^{1-\alpha}
\]  \hspace{1cm} (1)

Where \( Y_t \) is output, \( A_0 \) is stock of knowledge, \( t \) is time, \( K_t \) is the capital stock, \( L_t \) is labour and where \( \alpha \) and \( 1 - \alpha \) are the respective, capital and labour share. Since stock of knowledge not only changes with time but also depends on a shift variable such as \( Z \) where \( Z \) for our purpose will be exports of services. The rate of change of \( Z \) and its lags are included in the short run dynamic equation based on error correction mechanism adjustment process to test if \( Z \) has temporary effect. Coefficient of changes in \( Z \) and its lags will be insignificant if \( Z \) has no temporary effect.

GETS based specification without intercept and trend to capture long run and short run effects of \( Z \) on \( Y \) is:

\[
\Delta \ln Y = -\varphi (\ln Y_{t-1} - (\beta_1 \ln K_{t-1} + \beta_2 \ln L_{t-1} + \beta_3 \ln Z_{t-1})) + \sum \gamma_n \Delta \ln K_{t-n} + \sum \gamma_j \Delta \ln L_{t-j} + \sum \gamma_m \Delta \ln Z_{t-m} + \sum \gamma_f \Delta \ln Y_{t-(t-n)}
\]  \hspace{1cm} (2)

if \( Z \) to have both permanent and short run effect, \( \beta_3 \) and some \( \gamma_m \) would be significant, while \( Z \) to have permanent effect only then \( \beta_3 \) will be significant while on the other hand if \( Z \) only has short run effect then \( \beta_3 \) will be insignificant while some \( \gamma_m \) will be significant.
6. Empirical Results with GETS and Engle Granger

6.1 GETS Approach with Exports of Services

LSE-Hendry GETS approach with its autoregressive distributed lag structure and its ECM is estimated with Non Linear Least Squares (NLLS) and a restricted intercept term with Microfit 4.1 version. The specification of baseline equation (2) with two conditioning inputs capital and labour and a Z shift variable, exports of services is estimated for Fiji for the period 1975-2003. Where \( \ln X_s \) is exports of services and \( T \) is time trend. Using the ARDL formulation with lags up to 4 periods and by using standard variable deletion test, the estimated parsimonious equation where the export of services has both temporary and permanent effect is given in equation (3) as follows\(^2\):

\[
\Delta \ln Y = 2.98 + 0.01T - 1.20(\ln Y_{t-1} - (0.39 \ln K_{t-1} + 0.01 \ln X_{s,t-1})) + 1.85\Delta \ln K_{t-1} + 0.59\Delta \ln L_t
\]

\[
= (-16.25)^* (c)^3 \quad (6.48)^* \quad (5.15)^* \quad (5.57)^* \quad (3.67)^* \quad (4.26)^* \quad + 0.01\Delta \ln X_{s,t-1} \quad (3)
\]

\[
(5.57)
\]

\[
R^2 = 0.65502 \quad \text{SER} = 0.027753 \quad \text{Period:} \ 1975-2003
\]

\[
\chi^2_{gf} = 2.0859[0.149]; \chi^2_{a} = 0.51649[0.772]; \chi^2_{scl} = 1.1635[1.281]; \chi^2_{hs} = 2.060[0.151]
\]

* and ** indicate significant at 5% and 10% levels respectively. The t-ratios are in the parentheses below the coefficient, p-values are in the square brackets for the \( \chi^2 \) tests

\(^2\) The estimated equation is a production function in time series data, not a growth equation although it looks like a growth equation. The service export variable, as a shift variable, only adds to the level of output, not to its growth rate.

\(^3\) Where c represents constrain on the parameter
The above estimates indicate that the baseline equation that is estimated is meaningful thus giving satisfactory result. All the coefficients are found to be significant at the conventional 5% level. The t-ratios are indicated below the coefficients, except for $\chi^2$ summary statistics where p-values are in brackets. The $\chi^2$ statistics indicate that there is no serial correlation ($\chi_{sc}^2$), non-normality ($\chi_n^2$), heteroscedasticity ($\chi_{hs}^2$) and functional form misspecification ($\chi_{ff}^2$). The standard error of regression (SER) is found to be high but it is plausible for a small island country where output level is highly volatile. The coefficient of error correction coefficient (lambda) is -1.20 which is close to one has correct negative sign serving as the negative feedback function. This implies that if there are departures from equilibrium in the previous period, this departure is adjusted quickly back to equilibrium.

Another noteworthy finding is that the rate of total factor productivity captured by the coefficient of trend (T) is positive implying that in Fiji efficiency has increased with time at the rate of 1% per year. Similar observations were made by Rao, Singh and Nisha (2006). This resulting fact maybe due good management skills, productive investment and maybe due to increase in the share of exports of services in Fiji’s total exports. On the other hand the coefficient of $\Delta \ln X_{s,t-1}$ implies that a 10% increase in exports of services will increase the level of output temporarily by 1% per year. This low increase in output maybe due to the fact that an increase in export of services has a weak backward and forward linkage effects in Fiji. This suggests that import penetration in Fiji is high and thus consumption is mostly of white goods.

The effect of export of services both in long run and short run is positive and significant. Therefore, we say that export of services has a positive permanent and short run effect on output showing there is a meaningful long run relationship between the export of services and output. The estimated share of profit is around 0.39, which is plausible and close to the stylized value of one-third in growth accounting exercises. The EG estimate on the other hand implies a profit share of 0.26 which seems more reasonable then the GETS estimate, therefore we re-estimated equation (4) by using the stylized value of profit share.
and constraining that the coefficient of capital is 0.3. The Wald test statistic for the null that $\beta = 0.3$ gives a p-value in the brackets is $\chi^2(1) = 1.4332[0.231]$. Incorporating this constraints, gives very similar results to that in (4). As noted earlier the short and long run effect of export of services is positive and significant. The actual and predicted values for the level of output are shown below in figure 3, which seems to be satisfactory.

**Figure 3**

![Actual and Fitted Values of DlnY](image)

### 6.2 Engle-Granger (EG) Approach with Exports of Services

The Engle-Granger (EG) two-step procedure method is the second alternative approach to GETS that is employed to determine the long run relationship between the level of output and exports of services. It was a widely used approach in applied time series studies prior to VAR methodology. Further, EG offers a unified framework for estimating and testing co-integrating relationships in the context of ECM’s. It is a single equation method and easy to implement. Furthermore two approaches are used to see if both approaches give similar results. This method requires pre-testing for unit roots and results are detailed in table-1. Therefore it is possible to apply EG cointegrating technique to
estimate the baseline long run output equation and then estimate the short run dynamic relationships based on the error correction adjustment model.

Therefore plausible cointegrating equation found between $\ln Y$, $\ln K$ and $\ln X_s$ is as follows:

$$\ln Y = -3.59 + 0.26 \ln K + 0.74 \ln L + 0.09 \ln X_s \quad (4)$$

The coefficients $\ln K$ and $\ln X_s$ have the expected signs and are positive. Equation (4) implies that the share of profit is 0.26, which is lower than 0.39 in GETS thus this estimate is also plausible$^4$. The implied long run share of exports of services is 0.09 which is higher than 0.01 of GETS. This difference is partly due to endogeneity problems, which does not seem to be serious. From the EG co-integrating vector, the residual or error correction term is generated and saved. It should be noted that the two-step EG method does not allow for endogeneity tests and therefore it is pre-assumed that the function is for the level of output. The second stage EG dynamic adjustment equation for this version with the trend estimated with Ordinary Least Squares (OLS) is as follows:

$$\Delta \ln Y = -0.12 + 0.01T - 1.26 ECM_{t-1} + 0.97 \Delta \ln K_{t-1} - 0.62 \Delta \ln L_{t-1} - 0.44 \Delta \ln L_{t-2}$$

$$+ 0.17 \Delta \ln X_s + 0.15 \Delta \ln X_{s,t-1}$$

$$\chi^2_{17} = 4.4619[0.035]; \chi_{17}^2 = 0.66018[0.719]; \chi_{17}^2 = 0.042045[0.838]; \chi_{17}^2 = 0.062689[0.802]$$

$$R^2 = 0.67133 \quad SER = 0.027270 \quad Period: 1975 – 2003$$

$^4$ Inclusion of a trend variable in (4) gave implausible negative coefficient of services exports, but (t) was close to the GETS estimate and significant at 1% level. The Ericsson-MacKinnon computed value is – 6.489(-4.071) and the critical value is in brackets. Thus the null of no cointegration is rejected at 5% level.
* and ** indicate significant at 5% and 10% levels respectively. The t-ratios are in the parentheses below the coefficient, p-values are in the square brackets for the $\chi^2$ tests.

The above estimate indicates that the baseline equation is satisfactory. All coefficients are significant at 5% level. The chi-square summary statistic shows that there is some functional form misspecification at 5% but not at 1% level. As in the GETS equation the coefficient of trend is positive at 0.01 and slightly different from GETS equation. The equation implies that total factor productivity in Fiji has been positive thus Fiji’s efficiency has increased with time at the rate of 1% per year. Moreover the coefficient of the error correction term (ECM) in EG is -1.26, which is similar to the ECM in GETS of -1.20 implying that convergence to equilibrium will be faster. It is noteworthy that the coefficient of $\Delta \ln Xs$ is significant at 5% level. This implies that a 10% increase in export of services will increase the level of output by about 1.7%.

To further improve the results we adopted some parameter restrictions noting that $\Delta \ln L_{t-1}$ and $\Delta \ln L_{t-2}$ are similar in signs and magnitudes. The Wald test statistic with p-value in brackets is $\chi^2 (1) = 1.0663[0.302]$. Similar conclusions are drawn regarding $\Delta \ln Xs$ and $\Delta \ln Xs_{t-1}$. The Wald test statistic with p-value in brackets is $\chi^2 (1) = 0.084423[0.771]$. The Wald test approved both these restrictions and therefore the preferred EG dynamic equation is obtained below where there is no functional form misspecification.

$$
\Delta \ln Y = -0.11 + 0.01 T - 1.19 ECM_{t-1} + 0.94 \Delta \ln K_{t-1} - 0.52 \Delta \ln L_{t-1} - 0.52 \Delta \ln L_{t-2} \\
- (3.13)^* (4.01)^* (-6.49)^* (2.73)^* (-4.82)^* (C)^5 \\
+ 0.14 \Delta \ln Xs + 0.14 \Delta \ln Xs_{t-1} \\
(4.49)^* (c) \\
(6)
$$

$$
\bar{R}^2 = 0.68538 \quad SER = 0.026681 \quad Period : 1975 – 2003
$$

$$
\chi^2_{ff} = 2.3737[0.123] ; \chi^2_n = 0.1998[0.905] ; \chi^2_{ccl} = 0.14558[0.703] ; \chi^2_{hs} = 0.009122[0.976]
$$
* and ** indicate significant at 5% and 10% levels respectively. The t-ratios are in the parentheses below the coefficient, p-values are in the square brackets for the $\chi^2$ tests.

All the coefficients of the re-estimated equation are significant at 5% level with correct sign. All the $\chi^2$ statistics are satisfactory and thus functional form misspecification is eliminated in equation (7). The coefficient of trend is 0.01 and positive which captures technical progress indicates that efficiency in Fiji is increasing at the rate of 1% per year. The error correction term has coefficient of -1.19, which provides a negative feedback function and resembles the ECM in GETS, indicates convergence towards equilibrium is faster. The coefficient of $\Delta \ln Xs$ is significant and indicates that a 10% increase in exports of services increases the level of output by about 1.4%. It is noted that there is a significant improvement in standard error of regression (SER) in equation (7) when compared to equation (6) even though $R^2$ has slightly increased. Thus equation (7) is the most preferred EG dynamic adjustment equation. The actual and predicted values for the level of output are shown below in figure 4, which seems to be satisfactory.

**Figure 4**

![Actual and Fitted Values of DlnY with EG](image)

7. **Conclusion**

5 Where c represents constrain on the parameter
The paper quantitatively explored the nexus between the level of output and exports of services for Fiji using a basic neo-classical cobb-douglas production function with two conditioning variables capital and labour and a shift variable, exports of services. According to economic theory it is well known that capital (K) and labor (L) are significant determinants of a country’s output. Empirical results for the baseline equation estimated with GETS and EG are found to be satisfactory. The coefficient of trend (T) that is used to capture the rate of technical progress in Fiji is found to be positive thus implies that Fiji’s efficiency has increased with time at the rate of 1% per year. This maybe possible due to reasons stated earlier such as productive investment and increase in the share of exports of services in Fiji’s total exports. Furthermore the baseline GETS equation (3) implies that the share of profit for Fiji is 0.39 and with EG it is 0.26. When constraining the profit share to 0.3, the share of profit for Fiji is around 0.26, which is plausible and close to the stylized value of one third found in many growth accounting exercises.

By adding an additional shift variable, exports of services apart from K and L in the production function implies that export of services did have both permanent and temporary positive effect on output. Thus 10% increases in export of services will temporarily increase the level of output by about 1%. The EG results imply that these would be 1.4% per year. This low short run effect is due to weak backward and forward linkage in Fiji. In Tourism, import penetration ratio is around 60%. Moreover the coefficient of the error correction term implies that convergence towards equilibrium will be elaborate.

In conclusion it is possible to say that short and long run output level in Fiji is mainly affected by export of services. Therefore our output level can be improved in the short run by increasing exports of services and thus policies to improve efficiency are also necessary. These may include good governance, property rights, political stability, trade openness and other institutional features.
7. References

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Data Appendix A

Y - is the real GDP at factor cost (1995= 100).

L - is the level of employment.

K - is real capital stock estimated with the perpetual inventory method with the assumption that the depreciation rate is 4%. The initial capital stock is 1.5*RGDP in 1969. Investment data used to compute K includes investment in private and government corporate sectors. Source: Output, Employment, Capital and Investment data used are from Prof. B.B.Rao’s 2006 EC405 lab session at the University of the South Pacific, Suva, Fiji.

Xs - is exports of services, deflated by GDP deflator. Source: Export of Services data is from the IFS CD-ROM 2003.
### Appendix B: Fiji’s International Trade in Services

<table>
<thead>
<tr>
<th>Broad Categories of Trade in Services</th>
<th>Sub-sectors of Trade in Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>Sea Transport&lt;br&gt;Passenger&lt;br&gt;Freight</td>
</tr>
<tr>
<td>Air Transport</td>
<td>Passenger&lt;br&gt;Freight&lt;br&gt;Other</td>
</tr>
<tr>
<td>Travel</td>
<td>Business&lt;br&gt;Personal – Health Related&lt;br&gt;- Education Related</td>
</tr>
<tr>
<td>Communication</td>
<td>Postal&lt;br&gt;Telecommunication</td>
</tr>
<tr>
<td>Construction</td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td>Insurance Service&lt;br&gt;Freight Insurance on Goods&lt;br&gt;Insurance Receipts/Payments</td>
</tr>
<tr>
<td>Financial Services</td>
<td></td>
</tr>
<tr>
<td>Computer and Information</td>
<td></td>
</tr>
<tr>
<td>Royalties and License Fees</td>
<td></td>
</tr>
<tr>
<td>Other Business Services</td>
<td>Merchanting and Other Trade Related&lt;br&gt;Operational Leasing Services&lt;br&gt;Miscellaneous Business &amp; Professional Services&lt;br&gt;Legal, Accounting, Management etc&lt;br&gt;Advertising Market Research&lt;br&gt;Research &amp; Development&lt;br&gt;Architectural, Engineering etc&lt;br&gt;Agricultural, Mining, On site processing&lt;br&gt;Other</td>
</tr>
<tr>
<td>Personal, Cultural &amp; Recreational Activities</td>
<td>Audiovisual &amp; related activities&lt;br&gt;Other personal, cultural Services</td>
</tr>
<tr>
<td>Government Services</td>
<td></td>
</tr>
</tbody>
</table>
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