行政院國家科學委員會專題研究計畫成果報告
APEC「提前部門自由化」(EVSL)
對我國總體與產業經濟之一般均衡分析
A CGE Analysis of EVSL – A Case Study of Chinese Taipei

計畫編號： NSC 89-2415-H-002-021-
執行期限： 88年8月1日至89年7月31日
主持人：徐世勳 臺灣大學農業經濟學系
計畫參與人員：許鈁鑫 行政院主計處研究員
許光中 臺灣大學農業經濟研究所碩士

一、中文摘要

「提前部門別自由化」或稱「自願性提前自由化部門」（Early Voluntary Sectoral Liberalization，簡稱 EVSL）的概念，首先於一九九七年一月 APEC 第一次資深官員會議中提出，其後在五月召開的第二次資深官員會議時，APEC 貿易投資委員會主席要求各會員國提交可提前自由化之部門別清單。之後於一九九七年十月 APEC 召開資深官員特別會議時，將六十一項部門彙整成四十一項，同時指示各會員國就四十一項部門依無條件支持、原則支持、部分支持及有興趣等四種不同程度加以挑選，彙整提交年度部長會議。之後於一九九七年 APEC 年度部長會議，經由決議，依照各部門受上述支持程度之高低，選定了漁產品(Fish and Fish Products)、林產品(Forest Products)、能源及其設備(Energy)、化學及其製品(Chemicals)、寶石及貴金屬(Gems and Jewelry)、醫療器材與設備(Medical Equipment and Instrument)、玩具(Toys)、環保設備與服務(Environmental Goods and Services)、通訊相互認證協議(Telecommunications Mutual Recognition Agreement)、汽車、航空器、食品、油籽及油脂、肥料、天然橡膠等十五項部門，列為 EVSL 擬推動自由化的部門，其中上述的前九項部門，即所謂的 A+清單，特別列為最優先推動的部門。此處所謂的「提前部門別自由化」（EVSL），有三項特色：(1)該自由化應基於自願性的原則，(2) A+清單的九項提前自由化部門必須採「全面加入的套案」(Trade Package)來處理，(3)九項提前部門別自由化 A+清單，最遲在2005年，關稅稅率必須調降至零。

為探討 EVSL 提案的實施對台灣與 APEC 主要會員國在國際貿易、總體經濟與主要產業的可能影響，本研究以美國 Purdue 大學 Center for Global Trade Analysis 所建立的全球貿易分析模型（Global Trade Analysis Project，簡稱 GTAP），參照 EVSL 提案的內容，進行各會員國相關減讓清單的關稅減讓，藉由模擬結果分析 EVSL 關稅減讓對台灣與 APEC 主要會員國間貿易的影響及對台灣總體經濟及主要相關產業之影響。

關鍵詞：可計算一般均衡分析(CGE)，「提前部門別自由化」(EVSL)，全球貿易分析模型（GTAP），政策模擬

Abstract

EVSL is one of the most debated APEC initiatives. The list of liberalization consists of more than three thousand items and its impact covers almost all sectors of the economy. Using GTAP (Global Trade Analysis Project) model and its version 4 database, this study simulates five different scenarios of trade liberalization in terms of schedule and contents. It is found that the impacts of liberalization are different by sectors and by countries. In the case of Chinese Taipei, it is estimated that exclusion of fish and fish products from A+ list may be beneficial initially according to

macroeconomic indicators. However, the long-term effects remain to be explored. The exclusion of food sector shows negative initial effects in term of macroeconomics but the impact on the agricultural sector is not clear. Excluding oilseeds, on the other hand, demonstrates a clear improvement in Chinese Taipei's trade balance and terms of trade.

Keywords: Computable General Equilibrium (CGE) Analysis, Early Voluntary Sectoral Liberalization (EVSL), Global Trade Analysis Project (GTAP), Policy Simulation.

二、緣由與目的

Trade and investment liberalization is one of the three pillars of Asia Pacific Economic Cooperation (APEC). Although its agreements are non-binding, APEC has made a significant effort to promote free trade. Among all the programs, Early Voluntary Sectoral Liberalization (EVSL) is one of the most debated initiatives. The idea of EVSL was raised in the first senior official meeting (SOM) in 1997. Later that year in SOM II in May, the chair of Committee on Trade and Investment (CTI) requested member economies to submit a list of sectors to be liberalized. In the special SOM in October, the 61 proposed sectors were consolidated into 41 sectors. Member Economies were requested to list the 41 sectors by four categories, from unconditional support to interested, and the results were compiled and reported to the ministers meeting.

In the 1997 ministers meeting, 15 sectors were chosen to implement trade liberalization; sectors were divided into two groups: nine sectors in A+ list and six sectors in A list. The A+ sectors were to begin liberation immediately and the A-list sectors were to follow. The A+ sectors are fish and fish products, forest products, energy, chemicals, gems and jewelry, medical equipment and instruments, toys, environmental goods and services, and telecommunications mutual recognition agreement. The A-list sectors are automobile, food, oilseed, fertilizer, rubber, and aircraft. Originally, three major goals were to be achieved: 1). Liberalization must be implemented under the principle of voluntary, 2). The nine sectors in the A+ list are to be treated as a trade package, and 3). The end date and end rate for A+ sectors are 2005 and 0%, respectively.

Since the beginning of implementation, there have been setbacks during the process. Difference exists among economies in the content and schedule of liberalization. Until the 1998 ministers meeting, members decided to send the A+ sectors to World Trade Organization (WTO) to continue the process of trade liberalization. The first SOM of 1999 in February further decided that the initiative to reduce tariffs of A+ sectors were to be referred to as Accelerated Tariff Liberalization (ATL). The second SOM held in early May reached the conclusion that the A-list sectors would also be sent to WTO. The hosting economy of 1999, New Zealand, briefed interested WTO members the latest information of EVSL after SOM I, and the process awaits further development.

This study aims to analyze the impacts of EVSL by employing a computable general equilibrium (CGE) model, General Trade Analysis Project (GTAP), developed by Purdue University, U.S.A. Scenarios of different tariff reductions are simulated to examine the outcome.

Fish and fish products have been a major topic of research of EVSL. Stokes and Cox (1998) states that the major fish product producers within the APEC region are China, Japan, Chile, US, Indonesia, and Thailand. Japan and US are also major importers of fish products. Import to Japan and US account for 75% of all import of the APEC region. In terms of export, Australia exports 95% of her fish products to other APEC economies, Japan being the largest market. The author also found that the degree of protection rises with the value added to the product. Another argument made by the authors is that the benefits of trade liberalization are determined not only by the reduction of tariff. Other factors, such as removal of Non-Tariff Measures (NTM), access to the vast market of China, limitation in supply of member economies after trade liberalization, and the substitutability between fish products and other goods, are also important factors in determining the benefits of trade liberalization in APEC region.

In addition, Stokes and Cox also find that many economies, under strong domestic pressure, are forced to raise NTM while reducing tariff. The rise of NTM undermines the effect of trade liberalization. Because of the difficulty in measuring the impact of NTM, the net effect of trade liberalization remains ambiguous. In the case of estimating Australian export of fish products to other APEC economies, the benefit of trade liberalization

is found to be dependent on the induced supply increase by other exporting APEC economies as a result of a larger market.

Macfarlane (1998) mentions that 80% of fish products of APEC economies are traded within APEC. It is estimated that trade liberalization and removal of NTM will increase export of fish products for Australia and New Zealand by 10%. It is a result of the relatively lower import tariff of these two economies. Another point made is that APEC members have different attitudes towards trade liberalization. US, Canada and New Zealand are supporters of trade liberalization of fish products. Other members, such as Japan, tend to exclude fish products from the list of trade liberalization sectors. Australia and New Zealand will benefit more form EVSL because of the lower trade barriers of fish products.

Graham, *et al* (1998) assesses the impact of EVSL with a partial equilibrium model of fish product trade. The results show that EVSL will significantly increase the demand for fish products within APEC and consequently increase the amount of export initially. However, the effectiveness of EVSL will be limited if trade liberalization is only implemented by developed economies. The reason is that most of the initial tariffs on fish products in developed economies are already low. There is therefore no much room for further tariff reduction. Through analyzing the fluctuations in demand and supply of fish products around the world and the impacts of price elasticity and cross elasticity of price, they estimate the changes in consumer surplus and producer surplus. However, their partial equilibrium analysis does not take into account interdependence among fish products, agricultural products and other sectors of the economy. It is also assumed that resource constraints do not exist. These shortcomings inevitably make the model less applicable to policy analysis.

Chiang and Sun (1998) estimated the impact of EVSL on the fish products of Chinese Taipei. The authors find that the fishery industry of Chinese Taipei, especially coastal fishery and aquaculture, may be greatly impacted. They argued that fishery policies are needed to create a sustainable fishery.

Theoretical Framework

Global Trade Analysis Project (GTAP) model is a multi-regional and multi-sectoral CGE model. It consists of several regional sub-models. The sub-models are linked through bilateral and multilateral trade. GTAP has four dimensions: production, consumption, trade and global service. This study is conducted with the GTAP database (version 4), which is the most updated database released in 1998. Version 4 uses year 1995 as the base year and consists of 45 regions and 50 sectors.

Production in GTAP is represented by a nested structure. This structure implies that production technology bears the features of separability and constant return to scale. It is assumed that primary inputs and intermediate inputs are separable. Constant elasticity of substitution (CES) functional form is employed to aggregate three types of primary inputs. The aggregated intermediate input is calculated, under Armington assumption and CES form, by combining regional product with imported intermediate input. Industry product is produced by combining aggregated primary input with aggregated intermediate input under the assumption of Leontief production function.

Final demand in GTAP is divided into household consumption, government spending, and saving. Final demand is presented by total utility, which is derived with a simplified Cobb-Douglas utility function to aggregate total household consumption, total government spending, and total saving. In terms of household consumption, the consumption function is assumed to be constant difference of elasticity (CDE). Aggregating household consumption of individual commodities produces total household consumption. Government spending is derived through a Cobb-Douglas utility function to estimate share of the budget of individual commodity. Estimated share is then used to construct the total government spending within each region. Saving receives a simpler treatment. It is derived by assuming Cobb-Douglas utility function and treated as a function of regional total income and price. GTAP has a clear distinction between the intermediate input and final demand of tradable goods and final demand and Armington assumption is applied to demand for imported goods. CES is applied to combine imported goods with regional products to generate a composite good.

Closure in GTAP adopts the neoclassical global closure principle. Margins are clearly identified. GTAP also has a global bank to link

investment and saving around the world. That is to say that GTAP assumes the existence of a global banking system, which make capital flow moves freely around the world. Therefore, when at equilibrium, global investment equals global saving.

The neoclassical closure principle adopted by GTP allows a difference between investment and saving within each region. The difference is therefore internalized and is used to depict the impact of trade policy on the current account. Another important feature of GTAP is its assumption of a global transportation system to accommodate margins. When global equilibrium is reached, total supply and total demand of transportation service reach a balance.

三、結果與討論

Results show that liberalization of A+ list and A list, excluding or including fish products, can increase the levels of social welfare and average utility per capita. For Chinese Taipei, excluding fish products yields better results in terms of social welfare. However, as will be explained later, when considering structural change and trade, excluding fish products may not seem to be beneficial. It is also found that excluding food sector from A list produces a clear negative effect for Chinese Taipei. Social welfare, average utility per capita and net trade balance will all decline. In the case of oilseeds, the result is the opposite. It is estimated that net trade balance, social welfare, and household income will rise. By subtracting scenario 1 from scenario 2, it is found that excluding fish products has a relatively smaller effect than reservations of A+ items. The most affected economy is Korea with a decrease of social welfare of US$346.92 million. However, excluding food has relatively significant effects on Australia, China, New Zealand and Korea. Japan and US and Korea will incur relatively large loss of social welfare in the case of excluding oilseeds. It is also found that items in A list have a larger impact on terms of trade.

Policy scenario shows that Chinese Taipei, Japan, Korea and Hong Kong will receive negative impact by liberalizing fish products, while New Zealand, Australia and Canada will benefit from liberalization of fish products.

In terms of export, the entire APEC region is to gain from trade liberalization. In terms of import, Chinese Taipei, China, Japan, Hong Kong, Korea and other APEC economies will increase production of fish products. Compare this result with table 8, it is clear that regions and sectors with higher degree of protection have larger increments in import after liberalization. Import of fish products by Australia and Canada, on the other hand, decrease.

Moreover, output of Japan, China and Korea increase but Chinese Taipei sustains a loss. An important finding from this table is that liberalizing fish products increase output for most of the world by creating a global market, which is beneficial to the majority of the world.

By comparing results from different policy simulations, it can be argued that the real effect of liberalizing fish products of Chinese Taipei remains ambiguous. It needs to be further studied by disaggregating the fish product sector and analyzed with a single country model.

Chinese Taipei, Australia, New Zealand and Korea gain significantly in food output. This is very similar to the results found in table 12: liberalization creates a global market. It shows negative impact on Chinese Taipei's food production but positive impact on that of China, Japan and Korea. Negative impact on export is found for all regions. In terms of import, only US import increases. Chinese Taipei, Japan and all other regions receive negative impact.

Results strongly suggest that Chinese Taipei should not exclude food sector from A list. It is also found that Chinese Taipei, as well as many other economies, will benefit from exclusion.

Concluding Remarks

Although EVSL is one of the most debated issues on APEC, there have been relatively few studies on this topic due to its complexity and continuous changes. This study attempts to provide a holistic picture of EVSL by utilizing a CGE model of trade.

Five scenarios are drawn to simulate the impact of trade liberalization. It is found that the effects of liberalization vary by sectors. In the case of Chinese Taipei, it is estimated that exclusion of fish and fish products during the first stage of liberalization may be beneficial initially according to macroeconomic indexes. However, the long-term effect remains to be explored. The exclusion of food sector shows negative initial effects in term of macroeconomics but the impact on the agricultural sector is not clear. Excluding oilseeds, on the other

hand, demonstrates a clear improvement in Chinese Taipei's trade balance and terms of trade.

The entire process of EVSL will soon be transfer to WTO. Findings from this study confirms that trade liberalization, in many cases, produces positive results by creating a global market. The significance of the findings applies not only to APEC, but also to all international organizations that believe in free trade.

四、計畫成果自評

本研究以美國 Purdue 大學 Center for Global Trade Analysis 所建立的全球貿易分析模型（Global Trade Analysis Project，簡稱 GTAP），參照 EVSL 提案的內容，進行各會員國相關減讓清單的關稅減讓，藉由模擬結果分析 EVSL 關稅減讓對台灣與 APEC 主要會員國間貿易的影響及對台灣總體經濟及主要相關產業之影響。內容與原計畫相符，達成預期目標。其次，藉由 EVSL 的分析，可與 APEC 相關學者專家建立合作關係，增進交流。本研究結果可提供國貿局、經濟建設委員會、農委會等政府單位參考。另外，參與本計畫之研究人員均可獲得 GTAP 模型的理論研發、GTAP 資料庫的熟悉、軟體程式設計與操作之訓練與實務經驗。最後，本計畫研究成果具學術與實用價值，極適合在學術期刊發表。

五、參考文獻

江福松、孫金華 (1998)《EVSL 對我國漁業之衝擊及其因應》，臺灣海洋大學漁業經濟研究所研究報告。

林幸君、劉瑞文、徐世勳（1998）<兩岸加入 WTO 對總體經濟與產業結構變動之影響評估－全球貿易分析模型(GTAP)之應用>，《台灣經濟學會年會論文集》，1998 年，第 81-113 頁。

孫金華、張靜貞、江福松 (1999) <APEC EVSL 對臺灣漁業之影響評估—漁業部門均衡模型之應用>，《經濟論文》，27(3)：359-383。

徐世勳、李慕真（1999）<氣候變遷對亞太地區農產貿易的影響>，《經濟研究》，36(1): 63-104。

徐世勳、許鈁鑫 (1999) <APEC 農業全面自由化與彈性處理的一般均衡分析>，《經濟論文》，27(4): 511-542。

陳策（1998）<APEC 推動「自願性部門別提前自由化」（EVSL）之現況及我廠商應有認識>《中華台北 APEC 通訊》，Vol.1。

Dee, P., A. Hardin, and M. Schuele (1998), *APEC Early Voluntary Sectoral Liberalization*, Productivity Commission Staff Research Paper, AusInfo, Canberra.

Graham, P., N. Klijn, A. Cox, A. Stokes, and J. Hartman (1998), "Modeling Seafood Trade Liberalization in the APEC Region," Research report from Australian Bureau of Agricultural and Resource Economics (ABARE).

Harrison, W. J. and K. R. Pearson (1994), *Computing Solutions for Large General Equilibrium Models Using GEMPACK*, Centre of Policy Studies and Impact Project Preliminary Working Paper No. IP-64, Monash University.

Hertel, Thomas W. (eds.) (1997), *Global Trade Analysis: Modeling and Applications*. Cambridge : Cambridge University Press.

McDougall, R.A., E. Aziz, and T.P. Truong (eds.) (1998), *Global Trade, Assistance, and Protection: The GTAP 4 Data Base*, Center for Global Trade analysis, Purdue University, Indianna, USA.

Stokes, A., and A. Cox (1998), "APEC Trade Liberalization and the Fisheries Sector - Key Issues and Uncertainties," in *OUTLOOK 98*, Proceedings of the National Agricultural and Resources Outlook Conference, Canberra, 3-5 February, vol. 1, *Commodity Markets and Resource Management*, ABARE, Canberra, pp. 245-54.