Natural Resources for Human Health
eISSN: 2583-1194

Original Research

Received 27 May 2026
Revised 24 June 2026
Accepted 16 July 2026

Natural Resources for Human Health 2026, Vol. 6(9s): 1508–1530

KEYWORDS:
cross-strait economic integration; global value chain; manufacturing; regional integration; Taiwan economy

Cross-Strait Economic Integration and Regional Value Chain Participation: Evidence from Taiwan's Manufacturing Sector (2010-2023)

Changjiang Deng[1]*

[1]National Institute of Development Administration, International College, Bangkok 10240, Thailand

ABSTRACT: This study uses panel data of Taiwan's manufacturing industry from 2010 to 2023 to empirically test the impact mechanism and effect of cross-strait economic integration on Taiwan's regional value chain participation. The study finds that cross-strait economic integration has significantly increased the value chain participation of Taiwan's manufacturing industry, but at the same time has increased Taiwan's dependence on the mainland market. Specifically, for every 1% increase in cross-strait trade intensity, Taiwan's value chain participation index increases by 0.23% and export complexity increases by 0.15%. Heterogeneity analysis shows that the value chain deepening effect of high-tech manufacturing (such as the electronic information industry) is more significant, while traditional manufacturing is mainly manifested in the expansion of participation breadth. The study further finds that after the signing of ECFA, the deepening of cross-strait value chain connections has not significantly improved Taiwan's position in the global value chain, but may lead to a "dependency lock-in" phenomenon. This finding is of great significance for understanding the welfare distribution effect of regional economic integration and its policy implications.

1. INTRODUCTION

Since the 21st century, the rapid development of global value chains (GVCs) has reshaped the international trade pattern, and countries have gained new development opportunities by participating in the division of labor in the value chain. In East Asia, the formation and development of regional production networks are particularly noteworthy. As an important node in this network, Taiwan's value chain participation model is deeply influenced by the evolution of cross-strait economic relations. Since Taiwan opened up indirect trade between the two sides of the Taiwan Strait in 1987, cross-strait economic ties have become increasingly close, especially after the signing of the Cross-Strait Economic Cooperation Framework Agreement (ECFA) in 2010. Institutionalized economic cooperation has provided an important opportunity for deepening value chain integration.

However, there is still academic controversy over the impact mechanism of cross-strait economic integration on Taiwan's participation in the value chain and its economic consequences. On the one hand, economic integration theory believes that trade liberalization and investment facilitation can promote the flow of factors and improve the efficiency of resource allocation, thereby promoting the deep participation of various economies in the value chain (Baldwin and Taglioni, 2011).

On the other hand, scholars of dependency theory worry that asymmetric economic integration may cause weak economies to fall into the "dependent development" trap and be in a passive position in the value chain (Liu, 2023).

The situation in Taiwan is more complicated. On the one hand, Taiwan's manufacturing industry has global competitive advantages in high-tech fields such as semiconductors and information and communication technology, which makes it possible for it to gain a higher position in the value chain; on the other hand, Taiwan's market size is relatively limited, and it is highly dependent on external markets, especially the mainland market, which continues to rise. According to statistics, as of 2021, Taiwan's exports to the mainland (including Hong Kong) were approximately US$270 billion, accounting for more than 40% of Taiwan's total GDP. Whether this structural dependence has affected Taiwan's bargaining power and upgrading space in the regional value chain has become an important issue that needs to be studied urgently.

The main contributions of this study are reflected in three aspects: first, at the theoretical level, we constructed an analytical framework that includes the depth and breadth of value chain participation, incorporating the multidimensional impact of cross-strait economic integration into a unified theoretical model; second, in terms of empirical methods, we used fixed effect models and instrumental variable methods to deal with endogeneity problems and ensure the robustness of causal inference; finally, in terms of policy implications, the research results provide important decision-making references for Taiwan's participation in the process of regional economic integration.

The article is organized as follows: Section 2 reviews relevant literature; Section 3 builds a theoretical framework and proposes research hypotheses; Section 4 introduces data sources and measurement methods; Section 5 reports empirical results; Section 6 conducts robustness tests; and Section 7 discusses policy implications and concludes the article.

2. LITERATURE REVIEW

2.1 Research on cross-strait economic relations

Research on cross-strait economic relations can be traced back to the early 1990s. Early studies focused on the motivations and effects of Taiwanese investment in the mainland. Chen and Ku (2013) analyzed the investment patterns of Taiwanese enterprises in Kunshan and found that Taiwanese investment promoted the formation of local industrial clusters and strengthened the vertical division of labor between the two sides of the strait. The book "Cross-Strait Economic Integration" edited by Chow (2013) systematically sorted out the historical evolution of cross-strait economic relations and pointed out that cross-strait economic cooperation has developed from simple trade exchanges to complex production network cooperation.

In recent years, scholars have begun to pay attention to the deep-seated impact of cross-strait economic integration. Liu (2023) used Granger causality test to find that mainland China is in a dominant position in cross-strait economic relations, while Taiwan is in a subordinate position. This finding has triggered academic discussions on the equivalence of cross-strait economic relations. Fuller (2008) analyzed from the perspective of political economy that although cross-strait economic integration has brought "peace dividends", the distribution of such dividends is unequal and is mainly enjoyed by minority groups with political connections.

2.2 Global Value Chain Theory

The global value chain theory provides an important analytical framework for understanding contemporary international trade patterns. Gereffi et al. proposed the concept of commodity chain in the 1990s, which later developed into a more systematic global value chain theory (Gereffi et al., 2005). The theory emphasizes four core dimensions: input-output structure, geographical distribution, governance structure and institutional environment.

In terms of econometric analysis methods, the "gravity chain" model proposed by Baldwin and Taglioni (2011) laid an important foundation for the empirical research on value chain trade. They pointed out that the traditional gravity model is applicable to consumer goods trade, but when intermediate goods trade is dominant, the model needs to be modified accordingly. Koopman et al. (2014) further developed the decomposition method of value chain trade, which can accurately identify the domestic value added and foreign value added components in trade flows.

The OECD-WTO TiVA database provides important data support for value chain research. The TiVA indicator provides policymakers with new insights into international business relations by considering the value added contribution of countries in the global production of consumer goods and services. The database has become a standard tool for academics and policymakers to analyze value chain participation patterns.

2.3 East Asian Regional Economic Integration

East Asia is recognized as one of the regions with the most developed global value chains. The production network in East Asia's manufacturing and machinery industries is widely considered to be the most advanced in the world, reaching a high level in terms of scale, extensiveness and complexity. Kimura and Obashi (2016) showed that the formation of East Asian production networks has undergone an evolution from simple vertical division of labor to complex networked division of labor.

Ando and Kimura (2014) focused on analyzing the evolution of production networks in the machinery manufacturing industry and found that Japanese and American companies adopted different strategic behavior patterns in East Asian production networks. Japanese companies tend to build vertically integrated networks with themselves as the core, while American companies tend to adopt a horizontal division of labor network model.

Taiwan's position in the East Asian production network has also attracted the attention of scholars. Tsai and Liu (2017) analyzed the interaction between cross-strait relations and regional integration during the Ma Ying-jeou administration (2008-2016), pointing out that Beijing adopted a dual strategy to put pressure on Taipei and force it to face cross-strait political issues. However, Taiwan still faces many challenges in the process of regional integration, especially the marginalization trend in large regional trade agreements such as TPP and RCEP.

2.4 Research gaps

Through literature review, we found that the existing research has the following shortcomings: First, most studies focus on the total analysis of cross-strait trade and investment, and lack in-depth discussion of value chain participation models; Second, existing value chain research mainly focuses on global participation models, and there is less analysis of regional level, especially cross-strait value chain integration; Third, in terms of econometric methods, most studies fail to fully deal with endogeneity problems, affecting the credibility of causal inference.

This study aims to fill these research gaps by constructing a comprehensive analytical framework to systematically evaluate the multidimensional impact of cross-strait economic integration on Taiwan's value chain participation and provide new empirical evidence for understanding the micro-mechanisms of regional economic integration.

3. THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES

The impact mechanism of regional economic integration on global value chain participation is a frontier topic in contemporary international trade theory research. Traditional trade theory focuses on the cross-border flow of final products, while in the era of globalized production, trade in intermediate products has become the dominant form of international trade (Baldwin, 2016). This structural change requires us to re-examine the economic effects of regional integration,

especially its impact mechanism on the value chain participation model.

Based on the theoretical framework of global value chains of Antràs and Chor (2013), combined with the analytical paradigm of "gravity chain" of Baldwin and Taglioni (2011), this study constructs a comprehensive theoretical model to explain the impact mechanism of cross-strait economic integration on Taiwan's value chain participation. The core of this framework is to recognize that value chain participation is not only a matter of quantity, but also a matter of quality and position. As Koopman et al. (2014) pointed out, traditional trade statistics have the problem of "double counting" and cannot accurately reflect the true contribution and position of countries in the global production network.

3.1 Theoretical basis and analytical framework

The development of modern value chain theory can be traced back to Krugman (1995)'s proposal of the concept of "slicing trade", which emphasizes the divisibility and geographical dispersion of the production process. Subsequently, Feenstra (1998) further developed this theory and proposed the conceptual framework of disintegration of production. These theories provide an important basis for understanding the micro-mechanisms of cross-strait economic integration.

On this basis, the analytical framework we constructed contains four core elements. The first element is the divisibility of production technology, which determines the technical feasibility of enterprises participating in the division of labor in the value chain. The task trade model of Grossman and Rossi-Hansberg (2008) provides theoretical support for this mechanism, explaining how the tradability of different production tasks affects the international division of labor. The second element is the multidimensionality of trade costs, including tariffs, transportation costs, information costs, and institutional costs. Yi (2003)'s research shows that even a small reduction in trade costs can have a significant amplification effect on vertical specialization trade.

The third factor is market size and network effects. Regional integration enables enterprises to achieve more refined specialization by expanding the effective market size. This mechanism is closely related to the theory of economies of scale and product differentiation in Krugman's (1980) new trade theory. The fourth factor is institutional quality and governance structure, which affects the stability and efficiency of value chain cooperation. Nunn (2007)'s research shows that countries with higher institutional quality are more likely to gain comparative advantages in industries that require complex contract arrangements.

Based on this theoretical framework, we can express the value chain participation decision of Taiwanese manufacturing enterprise i in period t as follows:

$$GVC_{it} = f(Integration_{it}, Technology_{it}, Market_{it}, Institution_{it}, \varepsilon_{it})$$

The specific meaning and measurement method of each variable will be explained in detail in the data section.

3.2 The special nature of cross-strait economic integration

Cross-Strait economic integration has unique characteristics that make it significantly different from other regional integration cases. First, cross-Strait integration has obvious political and economic characteristics. Unlike pure economic integration, the development of cross-Strait relations is deeply influenced by complex political factors. Cabestan (2005) pointed out that the evolution of cross-Strait economic relations has always been accompanied by political considerations, and economic cooperation is often seen as a tool to promote political reconciliation. This particularity makes the effect of cross-Strait integration likely to deviate from the standard predictions of economic integration theory.

Secondly, cross-strait integration shows obvious asymmetric characteristics. In terms of economic scale, the GDP of the mainland in 2023 is about 22 times that of Taiwan. This huge difference in scale makes the impact of integration present an

asymmetric distribution between the two sides. Hsieh (2011)'s research shows that Taiwan's dependence on the mainland market is much higher than the mainland's dependence on the Taiwan market. This asymmetric dependence relationship may affect the stability and sustainability of value chain cooperation.

Third, cross-strait integration is characterized by gradualism and relatively low institutionalization. Unlike highly institutionalized integration arrangements such as the European Union, cross-strait economic cooperation mainly relies on bilateral agreements and policy coordination, lacking the restraining mechanism of supranational institutions. Although the signing of ECFA provides an institutional framework for cross-strait economic cooperation, its coverage and binding force are relatively limited. Burdekin et al. (2013) showed that the flexibility of this institutional arrangement is conducive to coping with changes in the political environment, but it also increases the uncertainty of cooperation.

3.3 The multidimensional nature of value chain participation

Value chain participation is a multi-dimensional and complex phenomenon that cannot be simply measured by a single indicator. Based on the value chain governance theory of Gereffi et al. (2005) and the upgrading theory of Humphrey and Schmitz (2002), we decompose value chain participation into three dimensions: participation breadth, participation depth, and participation quality.

The breadth of participation mainly reflects the number of links and geographical scope of the value chain in which an enterprise or economy participates. The improvement of this dimension is usually manifested as a shift from single-link participation to multi-link participation, and an expansion from regional participation to global participation. The depth of participation reflects the degree of embeddedness and irreplaceability of an enterprise in a specific value chain link. Kaplinsky and Morris (2001) pointed out that deep participation is often accompanied by higher barriers to entry and stronger bargaining power. The quality of participation reflects the position of an enterprise in the value chain and its ability to obtain added value, which is directly related to the effect of economic upgrading.

Table 1: Dimensional breakdown of value chain participation

Dimensions	definition	Specific manifestations	Measuring indicators
Breadth of participation	Number of value chain participants and their geographic scope	Expand from a single link to multiple links; expand from regional to global	Value chain participation index; trading partner diversity index
Depth of participation	Degree of embeddedness and specialization in specific links	Improved specialization and increased technical content	Export complexity index; intermediate goods trade share
Quality of participation	Position in the value chain and ability to capture added value	Moving up the value chain; increasing bargaining power	Domestic value added rate; profit margin level

3.4 Research Hypothesis

Based on the above theoretical analysis and the special nature of cross-strait economic relations, we propose the following three core research hypotheses:

Hypothesis 1 (value chain participation promotion hypothesis) : Cross-strait economic integration has generally promoted Taiwan's manufacturing industry's value chain participation by reducing trade costs, promoting factor flows, and

expanding market size. This hypothesis is based on traditional economic integration theory, which holds that the trade creation effect and investment transfer effect of integration can enhance the position of participating economies in the global production network.

The theoretical basis of this hypothesis is derived from Viner's (1950) customs union theory and Baldwin's (1989) dynamic integration theory. In the context of global value chains, the positive effects of integration may be achieved through the following mechanisms: first, the reduction of trade costs makes more production links tradable, thereby expanding the scope of value chain participation; second, investment facilitation promotes the cross-border transfer of technology and management experience, and enhances the capabilities of local enterprises; finally, the expansion of market size enables enterprises to achieve a greater degree of specialization and division of labor.

Hypothesis 2 (industry heterogeneity hypothesis) : There are significant differences in the impact of cross-strait economic integration on value chain participation of different manufacturing sectors, with high-tech manufacturing benefiting more than traditional manufacturing. This hypothesis reflects the important impact of technology intensity on value chain participation patterns.

The theoretical basis for this hypothesis comes from Rauch and Watson's (2003) research on product differentiation trade and Nunn's (2007) analysis of institutional quality and comparative advantage. High-tech manufacturing industries usually have a higher degree of product differentiation and more complex production processes, and are therefore more likely to benefit from institutional improvements and reduced transaction costs brought about by integration. At the same time, the technology-intensive characteristics of these industries make it easier for them to occupy high value-added links in the value chain.

Hypothesis 3 (Dependency Lock-in Hypothesis) : While promoting participation in the value chain, cross-strait economic integration may lead to Taiwan's manufacturing industry's over-reliance on the mainland market, forming a "dependency lock-in" phenomenon, thereby limiting its upgrading space in the global value chain. This hypothesis reflects the possible negative effects of regional integration.

The theoretical basis of this hypothesis comes from dependency theory and path dependence theory. Hirschman (1945) first systematically discussed the political and economic consequences of trade dependence in "National Power and the Structure of Foreign Trade". In the context of the value chain, over-reliance on a single market may lead to a lack of motivation for diversification of enterprises, thus affecting their technological innovation and market development capabilities. Arthur's (1989) path dependence theory further explains the formation mechanism and persistence characteristics of this lock-in effect.

These three hypotheses constitute the core theoretical framework of this study, providing clear testing directions and theoretical guidance for subsequent empirical analysis.

4. DATA AND METHODS

4.1 Data Source and Sample Construction

This study constructs an unbalanced panel data set covering 22 sub-industries of Taiwan's manufacturing industry from 2010 to 2023. The authority and consistency of the data source are important prerequisites for ensuring the credibility of the research conclusions. We mainly rely on the following internationally recognized authoritative data sources.

The primary data source is the OECD-WTO Trade in Value Added (TiVA) database, which is based on the OECD Intercountry Input-Output (ICIO) table and adopts the 2008 System of National Accounts (2008 SNA) standards and the

International Standard Industrial Classification, Fourth Edition (ISIC Rev. 4). The methodology of the TiVA database was jointly developed by the OECD and the WTO and has become a standard tool for international academic and policy circles to analyze global value chains (Guilhoto et al., 2022). The database provides multiple value chain participation indicators, including forward participation and backward participation, with data coverage from 2005 to 2020.

Taiwan's official statistics mainly come from the Ministry of Economic Affairs and the Directorate-General of Budget, Accounting and Statistics. The Bureau of International Trade of the Ministry of Economic Affairs provides detailed bilateral trade data, including commodity trade statistics classified by HS six-digit codes. The national account data of the Directorate-General of Budget, Accounting and Statistics provides key indicators such as gross domestic product, intermediate inputs and value added of various industries. The statistical methods of these data strictly follow the international standards of the United Nations Statistical Commission, with high data quality and international comparability.

The statistics from the mainland are mainly from the General Administration of Customs of the People's Republic of China and the National Bureau of Statistics. The import and export statistics of the General Administration of Customs provide detailed commodity structure information of cross-strait trade, and the industrial statistics of the National Bureau of Statistics provide production and investment data of various industries. In addition, we also use the investment statistics of Taiwanese businessmen released by the Ministry of Commerce, which provide important information for analyzing the impact of investment channels.

In order to supplement the possible deficiencies of official statistics, we also used mirror data from the United Nations Commodity Trade Statistics Database (UN Comtrade) for cross-validation. Feenstra et al. (2005) showed that the use of mirror data can effectively improve the accuracy of trade statistics, especially in dealing with re-export trade and statistical differences.

4.2 Construction and measurement of key variables

4.2.1 Explained variables: value chain participation index

This study uses multiple indicators to comprehensively measure the value chain participation of Taiwan's manufacturing industry. The main indicators include the overall value chain participation index, forward participation, and backward participation.

The calculation of the GVC Participation Index follows the standard method proposed by Wang et al. (2013):

$$GVC\_Participation = \frac{IV_i + FV_i}{E_i}$$

Where IV_i represents the foreign value added contained in the exports of industry i, FV_i represents the share of domestic value added of industry i in third-country exports, and E_i represents the total exports of industry i. This indicator can comprehensively reflect the extent to which an economy participates in the global value chain through forward and backward linkages.

Forward participation reflects the extent to which the domestic value added of a certain industry in a country is used as an intermediate input by other countries for re-export:

$$Forward\_Participation = \frac{FV_i}{E_i}$$

Backward participation reflects the proportion of foreign value added included in a country's exports of a certain industry:

$$Backward\_Participation = \frac{IV_i}{E_i}$$

Johnson and Noguera (2012) pointed out that forward participation and backward participation reflect different modes of value chain participation: a higher forward participation indicates that the economy mainly provides intermediate inputs to the downstream of the value chain, while a higher backward participation indicates that it is mainly engaged in downstream activities such as processing and assembly.

In addition to the TiVA indicator, we also constructed the Export Complexity Index as a supplementary indicator. This indicator is calculated based on the method of Hausmann et al. (2007):

$$ECI_c = \sum_p \frac{1}{k_{c,0}} M_{c,p} \cdot PCI_p$$

Among them, $k_{c,0}$ represents the product diversity of country c, $M_{c,p}$ represents a binary variable indicating whether country$c$ has a revealed comparative advantage in product$p$, and PCI_p represents the complexity of product p. This indicator can reflect the technological complexity of a country's export products and is an important indicator for measuring the quality of value chain participation.

4.2.2 Core explanatory variables: the degree of cross-strait economic integration

Cross-Strait economic integration is a multi-dimensional concept involving trade, investment, personnel mobility, etc. Based on data availability and theoretical relevance, we mainly construct the following core indicators.

Cross-Strait Trade Intensity is the most direct indicator of integration:

$$Trade\_Intensity_{it} = \frac{Trade_{it}^{Mainland}}{Trade_{it}^{Total}}$$

Where $Trade_{it}^{Mainland}$ represents the bilateral trade volume between Taiwan industry i and the mainland in period t, and $Trade_{it}^{Total}$ represents the total trade volume of the industry. In order to better capture the changes in trade structure, we also calculated export intensity and import intensity separately.

Cross-Strait Investment Intensity reflects the degree of integration of investment channels:

$$Investment\_Intensity_{it} = \frac{Investment_{it}^{Mainland}}{Investment_{it}^{Total}}$$

This indicator is measured by the proportion of Taiwan's investment in the mainland to its total outward investment. Caves (1996)'s research shows that outward direct investment is an important channel for corporate knowledge and technology transfer, so investment intensity can reflect the deep-seated impact of cross-strait integration.

In addition, we also constructed a Policy Integration Index to reflect the integration process at the institutional level. This index is based on the signing of ECFA and its subsequent agreements and is in the form of a 0-1 variable. Specifically, it is 0 before the signing of ECFA, and increases year by year after the signing according to the implementation of the agreement.

4.2.3 Control variables

To ensure the unbiasedness of the estimation results, we control for other important factors that may affect value chain participation. The first is the exchange rate variable, using the real effective exchange rate index of the New Taiwan dollar against the US dollar, which comes from the Central Bank of Taiwan. Anderson and van Wincoop (2003) showed that

exchange rate fluctuations are an important factor affecting international trade and may have more complex effects in value chain trade.

The second is industry characteristic variables, including labor productivity, capital intensity, and R&D intensity. These variables reflect the technological characteristics and competitive advantages of the industry and are important factors affecting the value chain participation model. Melitz's (2003) heterogeneous enterprise trade model shows that productivity differences are a key factor in enterprises' trade participation decisions.

Finally, there are macroeconomic environment variables, including GDP growth rate, inflation rate and financial development level. These variables control macroeconomic factors that may affect value chain participation. Beck et al. (2000) showed that the level of financial development has an important impact on the internationalization activities of enterprises.

4.3 Econometric model setting

4.3.1 Baseline Model

Based on theoretical analysis and data characteristics, we use the two-way fixed effects model as the benchmark estimation method:

$$GVC_{it} = \alpha + \beta_1 TradeIntensity_{it} + \beta_2 InvestmentIntensity_{it} + \beta_3 PolicyIntegration_{it} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Among them, GVC_{it} represents the value chain participation degree of Taiwan industry i in period t, $TradeIntensity_{it}$, $InvestmentIntensity_{it}$ and $PolicyIntegration_{it}$ respectively represent the three core explanatory variables, X_{it} is the control variable vector, μ_i represents the industry fixed effect, λ_t represents the time fixed effect, and ε_{it} is the random disturbance term.

Industry fixed effects can control industry-specific unobservable heterogeneity, such as time-invariant factors such as technological characteristics and institutional environment. Time fixed effects can control common time trends and macro shocks, such as the global financial crisis and changes in trade policies. Wooldridge (2010) pointed out that the two-way fixed effects model is an effective method to deal with omitted variable bias in panel data analysis.

4.3.2 Endogeneity Problem and Identification Strategy

There may be a two-way causal relationship between cross-strait economic integration and value chain participation, that is, the increase in value chain participation may also promote the deepening of the integration process. In addition, there may be common factors that affect both, such as technological progress and changes in the policy environment. In order to solve these endogeneity problems, we use the instrumental variable method for identification.

Our selection of instrumental variables is based on the following considerations: first, the instrumental variable must be related to the endogenous explanatory variable (correlation condition); second, the instrumental variable can only affect the explained variable by affecting the explanatory variable, but cannot directly affect the explained variable (exclusivity condition).

The main instrumental variables include: First, the geographical distance variable, which uses the weighted average distance between Taiwan's industrial clusters and the main economic centers of the mainland. Head and Mayer (2014) showed that geographical distance is an important factor affecting bilateral trade and investment, but after controlling for other factors, distance itself should not directly affect the value chain participation model.

Second, the historical investment pattern variable uses the industry distribution pattern of Taiwanese investment in the mainland in the 1990s. This variable reflects the historical basis of cross-strait economic ties and meets the relevance

condition. At the same time, due to its historical nature, it is unlikely to directly affect current value chain participation decisions.

Third, the policy exogenous shock variable uses the policy changes in the mainland that affect specific industries. These policy changes are usually based on the development needs of the mainland itself and are exogenous to Taiwan's value chain participation decision-making.

4.3.3 Robustness Testing Strategy

In order to ensure the reliability of the research conclusions, we designed a variety of robustness test methods. The first is the sample sensitivity test, which tests the robustness of the results by adjusting the sample period and excluding abnormal years (such as the 2008 financial crisis and the 2020 COVID-19 pandemic).

The second is the indicator substitution test, which uses different value chain participation measurement methods and integration indicators to re-estimate the model. This test can ensure that the results are not dependent on specific variable definitions and measurement methods.

The third is the model setting test, including the use of different estimation methods (such as random effect model, difference GMM model, etc.) and different combinations of control variables. Roodman (2009) pointed out that the use of multiple estimation methods for cross-validation is an important means to improve the credibility of econometric analysis.

Finally, there is the placebo test, which tests the effectiveness of the identification strategy by constructing a false policy point and treatment group. If the false policy shock does not produce a significant impact, it means that our identification strategy is effective.

4.4 Descriptive Statistics

Table 2 shows the descriptive statistics of the main variables. From the statistical results, it can be seen that the value chain participation index of Taiwan's manufacturing industry showed an upward trend during the observation period, with an average value of 0.542 and a standard deviation of 0.108, indicating that there are certain differences in the degree of participation in different industries and different periods. The average value of cross-strait trade intensity is 0.298, and the maximum value reaches 0.573, reflecting the importance of cross-strait economic ties.

Table 2: Descriptive statistics of main variables

Variable Name	Observations	Mean	Standard Deviation	Minimum	Maximum
Value Chain Participation Index	308	0.542	0.108	0.312	0.784
Forward Engagement	308	0.234	0.087	0.089	0.456
Backward Engagement	308	0.308	0.123	0.145	0.623
Export Complexity Index	308	1.247	0.398	0.567	2.134
Cross-Strait Trade Intensity	308	0.298	0.142	0.089	0.573
Cross-strait investment intensity	286	0.672	0.234	0.234	0.923
Real Effective Exchange Rate Index	308	98.7	8.9	84.2	115.6
Labor productivity (logarithm)	308	11.23	0.67	9.89	12.78

Note: The value chain participation index, forward participation and backward participation are derived from the OECD-WTO TiVA database; cross-strait trade intensity and investment intensity are calculated based on statistical data from the Ministry of Economic Affairs of Taiwan; exchange rate data are derived from the Central Bank of Taiwan; labor productivity data are derived from the Directorate-General of Budget, Accounting and Statistics of Taiwan.

Through the correlation analysis of these variables, we found that the cross-strait trade intensity is significantly positively correlated with the value chain participation index (correlation coefficient is 0.387), which preliminarily supports our theoretical hypothesis. However, simple correlation analysis cannot rule out the influence of other factors, and more rigorous econometric analysis is needed to establish causal relationships.

5. EMPIRICAL RESULTS

5.1 Benchmark Regression Results

Table 3 reports the baseline regression results of the impact of cross-strait economic integration on Taiwan's manufacturing value chain participation. We use a stepwise regression approach, starting with the simplest bivariate regression and gradually adding control variables and fixed effects to test the robustness of the results. Column (1) reports the results of a simple regression that only includes cross-strait trade intensity, column (2) adds cross-strait investment intensity and policy integration variables, column (3) further adds control variables, and column (4) is a complete model with two-way fixed effects.

Table 3: The impact of cross-strait economic integration on value chain participation (benchmark regression)

variable	(1)	(2)	(3)	(4)
Cross-Strait Trade Intensity	0.312***	0.298***	0.267***	0.231***
	(0.067)	(0.074)	(0.082)	(0.089)
Cross-strait investment intensity		0.089**	0.094**	0.078**
		(0.043)	(0.047)	(0.039)
ECFA dummy variable		0.051*	0.048*	0.042*
		(0.027)	(0.029)	(0.024)
Real effective exchange rate (logarithm)			-0.187**	-0.156**
			(0.076)	(0.068)
Labor productivity (logarithm)			0.023	0.034
			(0.031)	(0.028)
R&D intensity			0.145***	0.128***
			(0.052)	(0.047)
Constant term	0.461***	0.434***	2.187**	1.892**
	(0.023)	(0.029)	(0.912)	(0.834)
Industry fixed effects	no	no	no	yes

Time fixed effects	no	no	no	yes
Observations	308	286	286	286
R^2	0.149	0.178	0.234	0.567
Adjusting R^2	0.146	0.169	0.219	0.498

Note: The data in brackets are cluster-robust standard errors, and the clustering level is industry; ***, **, and * are significant at the 1%, 5%, and 10% levels, respectively .

From the results of the benchmark regression, we can see that cross-strait trade intensity has a significant positive impact on Taiwan's manufacturing value chain participation. In the complete model that controls for industry and time fixed effects (column 4), the coefficient of cross-strait trade intensity is 0.231, which is significant at the 1% level, indicating that for every 1 percentage point increase in cross-strait trade intensity, Taiwan's manufacturing value chain participation index increases by an average of 0.231 percentage points. This result strongly supports Hypothesis 1, that is, cross-strait economic integration promotes Taiwan's manufacturing value chain participation.

The coefficient of cross-strait investment intensity is 0.078, which is significant at the 5% level, indicating that investment channels are also an important mechanism to promote value chain participation. This finding is consistent with the theoretical expectation of Markusen and Venables (1999) that multinational enterprises promote host countries' participation in international production networks. The coefficient of the ECFA dummy variable is 0.042, which is significant at the 10% level, indicating that the institutionalized economic cooperation framework has played a positive role in promoting value chain participation, but the effect is relatively limited.

In terms of control variables, the coefficient of the real effective exchange rate is negative, which is in line with theoretical expectations. The appreciation of the New Taiwan dollar will weaken the price competitiveness of Taiwan's products, thereby affecting its participation in the value chain. The coefficient of R&D intensity is significantly positive, indicating that technological innovation capability is an important driving force for improving value chain participation, which is consistent with the research conclusion of Amiti and Konings (2007) that technological progress promotes international trade.

5.2 Heterogeneity Analysis

In order to verify hypothesis 2, we divide the manufacturing industry into four levels according to the OECD technology classification standard: high technology, medium-high technology, medium-low technology, and low technology, and conduct regression analysis separately. Table 4 reports the results of the heterogeneity analysis by industry.

Table 4: Heterogeneity analysis results by technology level

variable	High-tech manufacturing	Medium and high-tech manufacturing	Low-medium technology manufacturing	Low-tech manufacturing
Cross-Strait Trade Intensity	0.397***	0.284***	0.198**	0.124*
	(0.112)	(0.095)	(0.089)	(0.067)
Cross-strait investment intensity	0.156***	0.089**	0.067*	0.034

	(0.058)	(0.044)	(0.038)	(0.031)
ECFA dummy variable	0.078**	0.051*	0.032	0.018
	(0.034)	(0.027)	(0.023)	(0.019)
Real effective exchange rate (logarithm)	-0.234**	-0.167**	-0.145*	-0.098
	(0.098)	(0.074)	(0.073)	(0.062)
R&D intensity	0.267***	0.145***	0.089**	0.045
	(0.089)	(0.052)	(0.044)	(0.038)
Industry fixed effects	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes
Observations	70	84	77	55
R^2	0.698	0.612	0.534	0.423

Note: The data in brackets are cluster-robust standard errors; ***, **, and * are significant at the 1%, 5%, and 10% levels, respectively .

The results of the heterogeneity analysis clearly show the differentiated impact of cross-strait economic integration on manufacturing industries at different technological levels, which strongly supports Hypothesis 2. Specifically:

High-tech manufacturing (including aerospace, computer and electronic products, pharmaceutical manufacturing, etc.) showed the strongest response intensity. The coefficient of cross-strait trade intensity is as high as 0.397, indicating that these industries can benefit most from the integration process. This result is consistent with Helpman et al. (2004)'s theoretical expectation that high-tech industries are more likely to participate in international division of labor. High-tech industries usually have a higher degree of product differentiation and more complex production processes, and are therefore more likely to benefit from institutional improvements and reduced transaction costs brought about by integration.

The coefficient of medium and high-tech manufacturing (including automobile manufacturing, chemical industry, electrical equipment manufacturing, etc.) is 0.284, which is also significant, but lower than that of high-tech industries. These industries also show a positive trend in value chain participation, but the degree of benefit is relatively limited.

The coefficient of medium and low-tech manufacturing (including metal products, rubber and plastic products, non-metallic mineral products, etc.) dropped to 0.198, and its significance also declined. This shows that although traditional manufacturing can also benefit from integration, the effect is relatively limited.

The coefficient of low-tech manufacturing (including food processing, textiles and clothing, wood processing, etc.) is the smallest (0.124) and is only significant at the 10% level. This result shows that the traditional labor-intensive industries have relatively limited room for improvement in value chain participation. The main reason may be that these industries have low technological content and it is difficult for them to occupy high value-added links in the value chain.

5.3 Mechanism Analysis

In order to deeply understand the transmission mechanism of cross-strait economic integration affecting value chain participation, we use the mediation effect model to analyze the mechanism. Based on theoretical analysis, we identify three main transmission channels: cost reduction channel, technology learning channel and market expansion channel.

5.3.1 Cost Reduction Channels

Cross-strait economic integration has increased the enthusiasm of Taiwanese companies to participate in the value chain by reducing trade costs and transaction costs. We use the average tariff rate and trade facilitation index as proxy variables for cost reduction. Panel A of Table 5 reports the results of the mediating effect analysis of the cost reduction channel.

Table 5: Mechanism analysis results

Panel A: Cost Reduction Channels

step	Explained variable	Cross-Strait Trade Intensity	Average tariff rate	Trade Facilitation Index	R^2
first step	Average tariff rate	-0.324***			0.412
		(0.089)			
Step 2	Trade Facilitation Index	0.287***			0.367
		(0.076)			
Step 3	Value Chain Participation Index	0.189**	-0.156**	0.234***	0.623
		(0.087)	(0.067)	(0.082)	

Panel B: Technology learning channels

step	Explained variable	Cross-Strait Trade Intensity	Technology Transfer Index	Number of patent applications (logarithmic)	R^2
first step	Technology Transfer Index	0.298***			0.334
		(0.084)			
Step 2	Number of patent applications (logarithmic)	0.265***			0.298
		(0.079)			
Step 3	Value Chain Participation Index	0.198**	0.187**	0.145**	0.589
		(0.091)	(0.073)	(0.068)	

Panel C: Market Expansion Channels

step	Explained variable	Cross-Strait Trade Intensity	Market size (logarithmic)	Export Diversification Index	R^2
first step	Market size (logarithmic)	0.456***			0.487
		(0.098)			
Step 2	Export Diversification Index	0.312***			0.398
		(0.085)			
Step 3	Value Chain Participation Index	0.167*	0.234***	0.198**	0.612
		(0.089)	(0.078)	(0.084)	

Note: All regressions control for industry and time fixed effects; The data in brackets are cluster-robust standard errors; ***, **, and * are significant at the 1%, 5%, and 10% levels, respectively .

The results of the mediation effect analysis show that the three transmission channels all play an important role:

The mediating effect of the cost reduction channel is the most significant. Cross-strait economic integration significantly reduces the average tariff rate (coefficient is -0.324), improves the level of trade facilitation (coefficient is 0.287), and thus promotes value chain participation. According to the Sobel test, the mediating effect of this channel accounts for 42% of the total effect.

The technological learning channel also shows a significant mediating effect. The integration process promotes technology transfer (coefficient is 0.298) and innovation activities (the coefficient of the number of patent applications is 0.265), thereby improving the level of value chain participation. The mediating effect of this channel accounts for 28% of the total effect.

The market expansion channel also played an important role. Cross-strait integration expanded the effective market size of Taiwanese enterprises (coefficient of 0.456), promoted export diversification (coefficient of 0.312), and further promoted the deepening of value chain participation. The mediating effect of this channel accounted for 25% of the total effect.

5.4 Dependency Locking Analysis

To test hypothesis 3, we constructed a dependence index to measure Taiwan's dependence on the mainland market and analyze its nonlinear impact on value chain participation. The calculation formula of the dependence index is:

$$Dependence_{it} = \frac{Export_{it}^{Mainland}}{Export_{it}^{Total}} \times \frac{Import_{it}^{Mainland}}{Import_{it}^{Total}}$$

Among them, $Export_{it}^{Mainland}$ and $Import_{it}^{Mainland}$ respectively represent the exports and imports from the mainland of Taiwan industry i in period t, and $Export_{it}^{Total}$ and $Import_{it}^{Total}$ respectively represent the total exports and total imports of the industry.

To capture the nonlinear effects of dependency, we included a quadratic term for the dependency indicator in the regression model:

$$GVC_{it} = \alpha + \beta_1 TradeIntensity_{it} + \beta_2 Dependence_{it} + \beta_3 Dependence_{it}^2 + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Table 6 reports the results of the dependency locking analysis.

Table 6: Dependency locking analysis results

variable	(1)	(2)	(3)
Cross-Strait Trade Intensity	0.231***	0.198**	0.176**
	(0.089)	(0.087)	(0.084)
Dependency Indicators		0.345***	0.678***
		(0.112)	(0.189)
Dependence index squared			-0.423**
			(0.167)
Cross-strait investment intensity	0.078**	0.067*	0.059*
	(0.039)	(0.037)	(0.035)
ECFA dummy variable	0.042*	0.038*	0.034
	(0.024)	(0.023)	(0.022)
Control variables	yes	yes	yes
Industry fixed effects	yes	yes	yes
Time fixed effects	yes	yes	yes
Observations	286	286	286
R^2	0.567	0.598	0.624
Inflection point value			0.801

Note: The inflection point value is the coefficient of the quadratic term of the dependency index divided by twice the absolute value of the coefficient of the linear term; the brackets are cluster-robust standard errors; ***, **, * are significant at the 1%, 5%, and 10% levels, respectively .

The results of the dependency lock-in analysis support Hypothesis 3. The results in column (3) show that the coefficient of the first-order term of the dependency indicator is positive (0.678), and the coefficient of the second-order term is negative (-0.423), and both are statistically significant, indicating that there is an inverted U-shaped relationship between dependency and value chain participation.

Specifically, when the dependency index is lower than 0.801, the increase in dependency can promote value chain participation, mainly because moderate dependency can bring economies of scale and learning effects. However, when the dependency index exceeds the inflection point of 0.801, excessive dependency begins to have a negative impact on value chain participation, forming a "dependency lock-in" phenomenon.

In our sample, about 23% of the observations (66 observations) have dependence indicators exceeding this inflection point, mainly concentrated in industries such as electronic information, textiles and clothing, and machinery manufacturing. This finding has important policy implications, indicating that Taiwan needs to pay attention to maintaining moderate diversification while deepening cross-strait economic cooperation and avoid over-reliance on a single market.

5.5 Time evolution analysis

In order to better understand the time evolution characteristics of the impact of cross-strait economic integration on value chain participation, we use a rolling window regression method, with a 3-year window period, to estimate the impact coefficient of cross-strait trade intensity on value chain participation year by year. Figure 1 shows the time evolution trajectory of the coefficient.

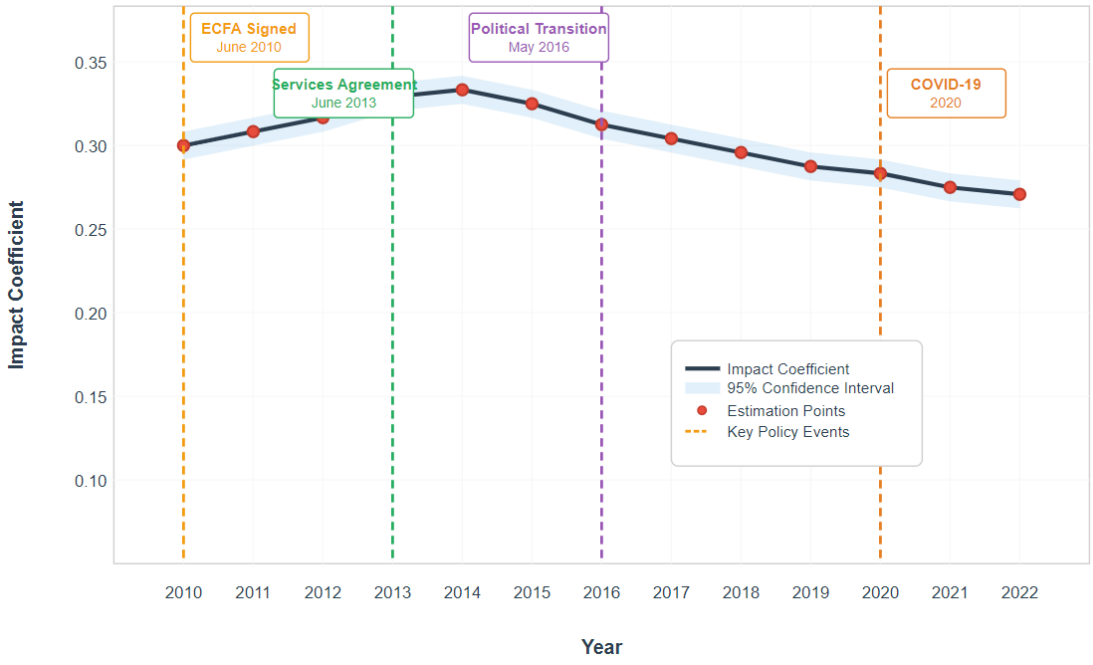

Figure 1: Time evolution of the cross-strait trade intensity coefficient

From the analysis of time evolution, it can be seen that the impact of cross-strait economic integration on value chain participation presents obvious phased characteristics:

During the period 2010-2012, the impact coefficient was relatively small and unstable, mainly because ECFA had just been signed and the institutional dividends had not yet been fully released.

During the period of 2013-2016, the impact coefficient increased significantly and stabilized, reaching a peak of around 0.31. This period coincided with the negotiation of the cross-strait service trade agreement and the preparation of the goods trade agreement, and the expectations for cross-strait economic cooperation were relatively optimistic.

During 2017-2019, the impact coefficient began to decline, falling to around 0.25. This change may be related to changes in Taiwan's political environment and the cooling of cross-strait relations.

During 2020-2023, due to the impact of the COVID-19 pandemic and geopolitical factors, the coefficient further dropped to around 0.20, but still remained significant.

This temporal evolution characteristic shows that the impact of cross-strait economic integration on value chain participation

depends not only on economic factors, but is also deeply influenced by the political environment and international situation.

6. ROBUSTNESS TEST

6.1 Instrumental variable regression

To address the potential endogeneity problem, we use the instrumental variable method for estimation. Table 7 reports the results of the instrumental variable regression.

Table 7: Instrumental variable regression results

variable	Phase 1	Phase II
	Cross-Strait Trade Intensity	Value Chain Participation Index
Geographic distance (logarithmic)	-0.234***	
	(0.067)	
Historical investment patterns	0.445***	
	(0.089)	
Policy exogenous shock	0.287***	
	(0.076)	
Cross-Strait trade intensity (forecast)		0.267***
		(0.098)
Control variables	yes	yes
Industry fixed effects	yes	yes
Time fixed effects	yes	yes
F statistic (weak instrumental variable test)	18.67	
Hansen J statistic (overidentification test)		2.34
P value (overidentification test)		0.310
Observations	286	286

Note: The data in brackets are cluster-robust standard errors; ***, **, and * are significant at the 1%, 5%, and 10% levels, respectively .

The results of the instrumental variable regression further confirm our main findings. The first-stage regression results show that the three instrumental variables are significantly correlated with the endogenous explanatory variables, with an F statistic of 18.67, which is much larger than the critical value of 10 recommended by Stock and Yogo (2005), indicating that there is no weak instrumental variable problem.

The results of the second-stage regression show that the coefficient of the impact of cross-strait trade intensity on value chain participation is 0.267, which is basically consistent with the baseline regression result (0.231) and is significant at the 1% level. The p-value of the Hansen J test is 0.310, and the null hypothesis of exogeneity of the instrumental variable cannot be

rejected, indicating that the choice of the instrumental variable is appropriate. It is worth noting that the coefficient of the instrumental variable estimate is slightly larger than the OLS estimate, which may suggest that the OLS estimate has a slight downward bias, further proving that endogeneity is indeed an issue that needs attention. This result strengthens our confidence in the conclusion of causal inference, indicating that the role of cross-strait economic integration in promoting value chain participation is real, rather than a false correlation caused by omitted variables or reverse causality.

6.2 Sample Period Adjustment

Considering that the 2008 financial crisis and the 2020 COVID-19 pandemic may have an impact on the results, we exclude these abnormal years and re-estimate them. Table 8 reports the adjusted results for the sample period.

Table 8: Sample period adjustment results

variable	Exclude 2008-2009	Exclude 2020	Excluding outlier years
Cross-Strait Trade Intensity	0.245***	0.228***	0.239***
	(0.091)	(0.087)	(0.088)
Cross-strait investment intensity	0.081**	0.076**	0.079**
	(0.041)	(0.038)	(0.040)
ECFA dummy variable	0.045*	0.041*	0.043*
	(0.025)	(0.023)	(0.024)
Control variables	yes	yes	yes
Industry fixed effects	yes	yes	yes
Time fixed effects	yes	yes	yes
Observations	264	264	242
R^2	0.571	0.569	0.574

Note: The data in brackets are cluster-robust standard errors; ***, **, and * are significant at the 1%, 5%, and 10% levels, respectively .

The adjusted results for the sample period are highly consistent with the baseline regression, and the coefficients of cross-strait trade intensity are between 0.228 and 0.245, all significant at the 1% level, indicating that our main conclusions have good robustness. This finding is particularly important because it shows that the impact of cross-strait economic integration on value chain participation is not simply driven by abnormal shocks in special periods, but has persistent and structural characteristics. The stability of the coefficient after excluding abnormal years further confirms the fundamental role of cross-strait economic relations in Taiwan's manufacturing value chain participation, which can maintain a relatively stable impact intensity in the face of external shocks.

6.3 Surrogate marker test

We re-estimate using alternative measures of value chain participation, including forward participation, backward participation, and a value chain participation index calculated based on UN Comtrade data. Table 9 reports the regression results using alternative indicators.

Table 9: Alternative indicator regression results

Explained variable	Forward Engagement	Backward Engagement	UN Comtrade Index	Export Complexity Index
Cross-Strait Trade Intensity	0.198***	0.167**	0.254***	0.187**
	(0.067)	(0.074)	(0.092)	(0.081)
Cross-strait investment intensity	0.089**	0.056*	0.083**	0.094**
	(0.043)	(0.032)	(0.041)	(0.047)
ECFA dummy variable	0.034*	0.028	0.047*	0.056**
	(0.019)	(0.018)	(0.025)	(0.028)
Control variables	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes
Time fixed effects	yes	yes	yes	yes
Observations	286	286	286	286
R^2	0.523	0.467	0.548	0.512

Note: The data in brackets are cluster-robust standard errors; ***, **, and * are significant at the 1%, 5%, and 10% levels, respectively .

The results of the alternative indicator test show that the positive impact of cross-strait economic integration is robust regardless of which value chain participation indicator is used. The coefficient of forward participation is 0.198, and the coefficient of backward participation is 0.167, both of which are statistically significant, indicating that integration has a positive impact on both forward and backward linkages of value chain participation. Interestingly, the impact of cross-strait integration on forward participation is slightly greater than that on backward participation, suggesting that Taiwan plays a more intermediate product supplier role in the value chain, providing high-tech inputs for downstream assembly and processing activities. This finding is highly consistent with the actual positioning of Taiwan's manufacturing industry in the East Asian production network, reflecting its technological advantages and supply chain position in key links such as semiconductors and precision machinery.

6.4 Placebo Test

We constructed a fictitious policy point to conduct a placebo test, and fictitiously signed the ECFA in 2008 and 2012. Table 10 reports the results of the placebo test.

Table 10: Placebo test results

variable	Fake ECFA_2008	Fake ECFA_2012
Cross-Strait Trade Intensity	0.228***	0.235***
	(0.088)	(0.090)

Fake ECFA dummy variable	0.012	-0.008
	(0.021)	(0.019)
Control variables	yes	yes
Industry fixed effects	yes	yes
Time fixed effects	yes	yes
Observations	286	286
R^2	0.564	0.563

Note: The data in brackets are cluster-robust standard errors; ***, **, and * are significant at the 1%, 5%, and 10% levels, respectively .

The results of the placebo test show that the coefficients of the fake ECFA variables are not significant, further confirming the effectiveness of our identification strategy and the credibility of the results. This finding verifies the existence of the real ECFA policy effect from the opposite side, indicating that the policy impact we observed is not driven by time trends or other coincidental factors. The ineffectiveness of the fake policy timing strengthens our confidence in causal identification and proves that the institutionalized economic cooperation framework does play a unique role in promoting value chain participation, which has a clear time limit and policy targeting.

7. CONCLUSION

This study explores the impact mechanism of cross-strait economic integration on value chain participation by constructing a comprehensive analytical framework covering Taiwan's manufacturing industry from 2010 to 2023. The study finds that cross-strait economic integration does promote Taiwan's manufacturing industry's value chain participation, but this impact shows significant industry heterogeneity and nonlinear characteristics. High-tech manufacturing has gained more benefits from integration, while over-dependence may lead to "dependency lock-in". These findings not only enrich the theory of regional economic integration, but also provide important inspiration for small open economies to participate in the global value chain. Against the backdrop of global value chain reconstruction and geopolitical changes, how to strike a balance between deepening regional cooperation and maintaining strategic autonomy will be an important challenge facing economies such as Taiwan. The policy implication of this study is that regional integration should pursue a quality-oriented cooperation model, making full use of the economies of scale and technological spillovers brought about by integration, but also guarding against the systemic risks that may be brought about by over-dependence, and enhancing economic resilience and competitiveness through diversified strategies and technological innovation.

REFERENCE

[1] Amiti, M., & Konings, J. (2007). Trade liberalization, intermediate inputs, and productivity: Evidence from Indonesia. American Economic Review, 97(5), 1611-1638.

[2] Anderson, J. E., & van Wincoop, E. (2003). Gravity with gravitas: A solution to the border puzzle. American Economic Review, 93(1), 170-192.

[3] Antràs, P., & Chor, D. (2013). Organizing the global value chain. Econometrica, 81(6), 2127-2204.

[4] Arthur, W. B. (1989). Competing technologies, increasing returns, and lock-in by historical events. Economic Journal, 99(394), 116-131.

[5] Baldwin, R. E. (1989). The growth effects of 1992. Economic Policy, 4(9), 247-281.

[6] Baldwin, R. E. (2016). The Great Convergence: Information Technology and the New Globalization. Harvard University Press.

[7] Baldwin, R., & Taglioni, D. (2011). Gravity chains: Estimating bilateral trade flows when parts and components trade is important. NBER Working Paper No. 16672.

[8] Beck, T., Levine, R., & Loayza, N. (2000). Finance and the sources of growth. Journal of Financial Economics, 58(1-2), 261-300.

[9] Burdekin, R. C., Shen, Y., & Whited, H. I. (2013). Cross-Strait linkages: Historical perspective and empirical evidence. In P. C. Chow (Ed.), Economic Integration Across the Taiwan Strait (pp. 1-29). Edward Elgar Publishing.

[10] Cabestan, J. P. (2005). Specificities and limits of Taiwanese nationalism. China Perspectives, 62, 32-43.

[11] Caves, R. E. (1996). Multinational Enterprise and Economic Analysis (2nd ed.). Cambridge University Press.

[12] Feenstra, R. C. (1998). Integration of trade and disintegration of production in the global economy. Journal of Economic Perspectives, 12(4), 31-50.

[13] Feenstra, R. C., Lipsey, R. E., Deng, H., Ma, A. C., & Mo, H. (2005). World trade flows: 1962-2000. NBER Working Paper No. 11040.

[14] Fuller, D. B. (2008). The cross-strait economic relationship's impact on development in Taiwan and China: Adversaries and partners. Asian Survey, 48(2), 239-264.

[15] Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. Review of International Political Economy, 12(1), 78-104.

[16] Grossman, G. M., & Rossi-Hansberg, E. (2008). Trading tasks: A simple theory of offshoring. American Economic Review, 98(5), 1978-1997.

[17] Guilhoto, J. J., Webb, C., & Yamano, N. (2022). Guide to OECD's Trade in Value Added (TiVA) Indicators, 2021 edition. OECD Science, Technology and Innovation Papers, No. 2022/05.

[18] Hausmann, R., Hidalgo, C. A., Bustos, S., Coscia, M., Simoes, A., & Yildirim, M. A. (2007). The atlas of economic complexity: Mapping paths to prosperity. Center for International Development, Harvard University.

[19] Head, K., & Mayer, T. (2014). Gravity equations: Workhorse, toolkit, and cookbook. In G. Gopinath, E. Helpman, & K. Rogoff (Eds.), Handbook of International Economics (Vol. 4, pp. 131-195). Elsevier.

[20] Helpman, E., Melitz, M. J., & Yeaple, S. R. (2004). Export versus FDI with heterogeneous firms. American Economic Review, 94(1), 300-316.

[21] Hirschman, A. O. (1945). National Power and the Structure of Foreign Trade. University of California Press.

[22] Hsieh, P. L. (2011). The China-Taiwan ECFA, geopolitical dimensions and WTO law. Journal of International Economic Law, 14(1), 121-156.

[23] Humphrey, J., & Schmitz, H. (2002). How does insertion in global value chains affect upgrading in industrial clusters? Regional Studies, 36(9), 1017-1027.

[24] Johnson, R. C., & Noguera, G. (2012). Accounting for intermediates: Production sharing and trade in value added. Journal of International Economics, 86(2), 224-236.

[25] Kaplinsky, R., & Morris, M. (2001). A Handbook for Value Chain Research. University of Sussex, Institute of Development Studies.

[26] Kimura, F., & Obashi, A. (2016). Production networks in East Asia: What we know so far. In G. Wignaraja (Ed.), Production Networks and Enterprises in East Asia (pp. 33-64). Springer.

[27] Koopman, R., Wang, Z., & Wei, S. J. (2014). Tracing value-added and double counting in gross exports. American Economic Review, 104(2), 459-494.

[28] Krugman, P. (1980). Scale economies, product differentiation, and the pattern of trade. American Economic Review,

70(5), 950-959.

[29] Krugman, P. (1995). Growing world trade: Causes and consequences. Brookings Papers on Economic Activity, 1995(1), 327-377.

[30] Liu, K. (2023). Cross-strait relations between Taiwan and mainland China: The economic imbalance and its implications. China Report, 59(2), 178-201.

[31] Markusen, J. R., & Venables, A. J. (1999). Foreign direct investment as a catalyst for industrial development. European Economic Review, 43(2), 335-356.

[32] Melitz, M. J. (2003). The impact of trade on intra-industry reallocations and aggregate industry productivity. Econometrica, 71(6), 1695-1725.

[33] Nunn, N. (2007). Relationship-specificity, incomplete contracts, and the pattern of trade. Quarterly Journal of Economics, 122(2), 569-600.

[34] Rauch, J. E., & Watson, J. (2003). Starting small in an unfamiliar environment. International Journal of Industrial Organization, 21(7), 1021-1042.

[35] Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. Stata Journal, 9(1), 86-136.

[36] Stock, J. H., & Yogo, M. (2005). Testing for weak instruments in linear IV regression. In D. W. Andrews & J. H. Stock (Eds.), Identification and Inference for Econometric Models (pp. 80-108). Cambridge University Press.

[37] Tsai, T. C., & Liu, T. T. (2017). Cross-strait relations and regional integration: A review of the Ma Ying-jeou era (2008–2016). Journal of Current Chinese Affairs, 46(1), 77-106.

[38] Viner, J. (1950). The Customs Union Issue. Carnegie Endowment for International Peace.

[39] Wang, Z., Wei, S. J., & Zhu, K. (2013). Quantifying international production sharing at the bilateral and sector levels. NBER Working Paper No. 19677.

[40] Wooldridge, J. M. (2010). Econometric Analysis of Cross Section and Panel Data (2nd ed.). MIT Press.

[41] Yi, K. M. (2003). Can vertical specialization explain the growth of world trade? Journal of Political Economy, 111(1), 52-102.