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TECHNOLOGY AND EQUITY MARKET CO-MOVEMENTS IN THE ASIA-PACIFIC: EVIDENCE FROM APEC INDICES

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Abstract
The Asia-Pacific Economic Cooperation (APEC) region is a vibrant economic center that has been influenced more by the technological development and digitalization. The paper explores the relationship between equity markets and technology indices in the APEC economies with the focus on co-movement dynamics in reaction to five key global crises (Oil Crisis, Climate Crisis, COVID-19 pandemic, Russia-Ukraine War, and Iran-Israel War). The study uses wavelet coherence analysis to study the time development of market interactions during these crises. The findings show that there has been a gradual rise in the level of technological integration and synchronization among the economies of the APEC, especially between the Climate Crisis and the COVID-19 pandemic. The analysis highlights how digital infrastructure and innovation policies can be used to enhance market connections and improve regional resilience. The long-term consistency of technology and equity markets implies that the integration of technology is now an essential part of the coordination of the economy in the region. The paper ends by making policy recommendations on how to develop sustained growth in technology, investment patterns and business planning in the APEC economies with special focus on the role of technology in ensuring economic stability and growth in the region.

Keywords: Asia-Pacific Economic Cooperation (APEC), technology markets, equity markets, wavelet coherence, economic resilience, global crises.

1. Introduction

The Asia-Pacific Economic Cooperation (APEC) is a key hub in the context of economic growth, trade liberalization, and technological innovation, where the economies form an important share of the global GDP and investment flows (Fang & Ju, 2024). In the last several decades, the accelerated development of digitalization and information technology has radically changed the environment of equity and technology markets in the economies of the APEC region and stimulated enhanced integration and interconnectivity (Henriques &Sadorsky, 2024). Digitalization enables the increase in the number of stakeholders involved in trade that is delivered in a digital form, as well as strengthening the bonds between technology-related markets and its role in the equity market. This further adds importance to the importance of co-movement dynamics in the region. Digital intensity is higher in economies with high-developed levels of digital infrastructure and favourable policies on innovation. This usually means more matching of the technology indices and the equity indices.

With APEC economies continuing to pursue regional integration and more specific policies, notably in digitalization domain, investigating the co-tendencies between equity indices and technology indices will accrue invaluable knowledge regarding financial integration, spillover effects, and the evolving nature of technological breakthroughs in determining market behavior (ERIA, 2023). This paper has attempted to disentangle these relationships as a way of making a deeper understanding of the way innovation and market integration is reshaping financial processes in the Asia-Pacific.

In 2020, the average of digital intensity in high-income APEC economies was 8.5 percent, compared to the average in non-high-income economies of 5.7 percent. The APEC region was overall average at 7.2% digital intensity (Ng et al., 2024; APEC, 2024). High-income APEC economies fell behind their non-high-income counterparts in digitalization development, as the digital intensity in the first experience grew by 41 percent between 2000 and 2020, against a 46 percent growth in non-high-income economies. On the whole, the level of digital intensity of APEC economies increased by 43% between 2000 (5.1%) and 2020 (7.2%) (Ng et al., 2024).

These fast paces are caused by a few aspects including the leapfrogging effect, by which the emerging economies can tap the latest technologies without the burden of legacy systems, by lowering costs of the digital technologies and by prompt government policy favoring the growth of digital infrastructure and upskilling.

Compared to the non-services industry, the services sector has a much stronger digital intensity and faster speed of digitalization, especially since 2000 to 2020. APEC economies had considerably more services industries digitized in 2020 compared to non-services industries, particularly manufacturing (Ferracane et al., 2018). The large figure of digital intensity in services is mainly calculated to significant degrees of digitalization in information and communications technology (ICT) and financial services areas, with a proportion of 29.3% and 21.0%, respectively (Sevastiuk et al., 2021). There was a dramatic 59.6 percent change toward digital intensity in commercial services over the period compared to a change of 44.0 percent in non-commercial services and just 12.5 percent in non-services sectors (Ng et al., 2024).
In exhibit 11 it can be seen that six APEC economies such as Brunei Darussalam, Chile, Indonesia, Peru, the Philippines and Russia had lesser digital intensity in their top three sectors of the gross value added compared to the APEC average. On the other hand, Australia, China, Malaysia, Singapore, Chinese Taipei and Thailand were the best performers with all three large sectors being more digitally intense than the APEC average. This result also confirms with the observation in Exhibit 7, where China, Malaysia, and Thailand had the most significant digital intensity in non-high-income economies, on the basis of high dependency in digital inputs in their main activities. On the whole, this consideration supports the key role that digitalization has in fuelling economic change and integration in the APEC markets.
The rest of the paper is organised as follows. Section 2 reviews the relevant literature. The research methodology, data and descriptive statistics are given in Sections 3 and 4. Section 5 reports and discusses the empirical results, The final section concludes.

2. Literature Review

The Asia-Pacific Economic Cooperation (APEC) region is recognized for its economic dynamism and technological advancement. As digitalization accelerates, understanding the co-movement between equity and technology indices becomes increasingly relevant for investors, policymakers, and researchers. This review of the literature shows the synthesis of the main data regarding financial integration, technological diffusion, digitalization intensity, and the contribution of innovation policy to the formation of market dynamics in APEC economies.
Evidence suggests that there is a substantial spillover in returns and volatility between the APEC markets, with particular emphasis on the financial stressful periods (Kakran et al.,

2023; Wang & Xiao, 2023; Kakran, Kumari, et al., 2023; Zhao & Park, 2024). The use of the vector autoregressive (VAR) model, the dynamic conditional correlation (DCC-GARCH), and the event study approach proved that equity markets in the region are tremendously volatile to shock events like the Global Financial Crisis and the COVID-19 pandemic (Ji et al., 2022; Choi, Singh et al., 2020; 2021; Zonon et al., 2025) . At the sector level, analyses show that Communication Services and Industrials are technology-related and most sensitive to the events, although country-wise and sector-wise patterns of co-movement differ (Shi et al., 2021; Du et al., 2025)

Foreign direct investment (FDI) or trade liberalization and the application of the flying geese model of technology transfers are examples of diffusion mechanism of technology at APEC (Kasahara, 2019). The new development of information and communication technology (ICT) and digital platforms has prompted high-speed transfer and integration of technologies within the member economies. Countries that have a high-quality digital infrastructure and good innovation policy perform better in terms of digital intensity and copresence between technology and equity indices (Javaid et al., 2024; Ahi et al., 2021; Nie et al., 2025)

Significant variations can be found in digital intensity, the extent to which industries utilize digital inputs in the economies of APEC. Per current APEC data analysis, Brunei Darussalam, Chile, Indonesia, Peru, the Philippines, and Russia have digital intensity below the APEC average level in all its major three sectors (APEC, 2023). On the contrary, Australia, China, Malaysia, Singapore, Chinese Taipei, and Thailand exhibit more digital intensity level in all of their key sectors, which denotes the integration of digital aspects in a broad way (Yan et al., 2023).

Notably, China, Malaysia, and Thailand, despite not being high-income economies, have achieved digital intensity levels comparable to their high-income peers due to the heavy use of digital inputs in their largest sectors. This suggests that proactive digital policy and targeted sectoral strategies can drive substantial digital transformation and market integration, even outside the high-income group(Heeks et al., 2024; SEFRINA, 2024).

Regulatory reforms in digital trade, intellectual property, and financial services have played a crucial role in promoting innovation and sectoral linkages within APEC (World Bank, 2022; Chen & Gao, 2022). The adoption of fintech and digital financial services has further deepened financial integration by increasing access to capital and supporting the growth of technology-driven sectors (Barroso & Laborda, 2022; Manta et al., 2025)

Despite notable progress, empirical evidence on the drivers and strength of co-movement between equity and technology indices remains limited by data availability, particularly for sector-specific and digital trade flows. There is also significant heterogeneity in co-movement patterns across APEC economies, reflecting differences in innovation capacity, digital infrastructure, and policy frameworks. The literature calls for ongoing regional collaboration and targeted policy interventions to bridge digitalization gaps and foster resilient, innovative markets.

Rafiuddin A. et al. (2023) and Henriques &Sadorsky, (2024) Evaluate FinTech growth and its contribution to the United Nations' Sustainable Development Goals (SDGs) via financial inclusion, by exploring the connectedness of FinTech with thematic indices.Develop a comprehensive financial risk assessment system for China, especially in the context of overlapping international and domestic risks(Ding & Wei, 2023; Wei & Wang, 2024; Simmons et al., 2022). Boubaker S. et al. (2023) and Banerjee et al. (2024)assess the role of big data analytics in investment decisions using China's A-shares market.

Boubaker et al. (2023) andNcube et al. (2024)Model stock price volatility in India's textiles and FinTech sectors, especially post-demonetization and during COVID-19. Ho L.T. et al. (2023) and Guru & Das, (2020) Examine how AI-adopting firms' stock performance

responded to COVID-19 and the Russia-Ukraine war.Analysed cumulative abnormal returns and volatility using Global X Fintech ETF and traditional market data (June 2021–Nov 2022)(Hasan et al., 2023Yang et al., 2024; Tripathi & Rengifo, 2025)
The literature underscores the dynamic and multifaceted nature of co-movement between equity and technology indices in the APEC region. While financial integration and technological progress have deepened market linkages, substantial variation persists across economies and sectors. Continued research and policy innovation are essential to harness the benefits of integration while managing associated risks.

3. Data and Methodology

3.1 Data

This study examines the co-movement among asset classes, including Technology and APEC Equity Markets. The empirical research employs daily log prices from January 2015 to December 2024, with data sourced from the Bloomberg Terminal. The chosen variables comprise Technology (W1TEC) and equity indices from APEC economies, specifically the Philippines (SBBCPHU), Canada (SBBCCAU), Australia (SBBCAUU), Chile (SBBCCHL), Singapore (SBBCSIU), Hong Kong (SBBCHKU), Taiwan (SBBCTAU), Indonesia (SBBCIDU), Thailand (SBBCTLU), Russia (IMOEX), the United States (SPX), Japan (SPJ500), South Korea (KR30), Vietnam (IDFPVNPD), Malaysia (FBMKLCI), China (SPC500CP), Mexico (TT0000), New Zealand (SBPCNZU), and Peru (SBPCPEU). This varied assortment of factors facilitates an extensive examination of interconnections and risk propagation across both traditional and sustainable financial markets.

Table1: Data

S.No	Category	Name of the Country	Name of the Variable	Symbol
1	19 Developed and Emerging APEC Countries	Philippines	PSEi	SBBCPHU
		Canada	TSX	SBBCCAU
		Australia	ASX 200	SBBCAUU
		Chile		SBBCCHL
		Singapore	STI	SBBCSIU
		Hong Kong	HK50	SBBCHKU
		Taiwan	TWSE	SBBCTAU
		Indonesia	JCI	SBBCIDU
		Thailand	SET Index	SBBCTLU
		Russia	MOEX	IMOEX
		USA	S&P 500	USSPX
		Japan	NIKKEI 225	SPJ500
		South Korea	KOSPI	KR30
		Vietnam	VNI	IDFPVNPD
		Malaysia	KLCI	FBMKLCI
		China	SHCOMP Index	SPC500CP
		New Zealand	NZSE50	SBPCNZU
		Mexico	BMV	TT0000
		New Zealand	NZSE50	SBPCNZU
		Peru	BVL	SBPCPEU
2	Technology	Global Indices	Dow Jones Global Technology Index	W1TEC

3.2 Methodology

Wavelet Analysis

Wavelet analysis is an effective method for investigating the time-frequency relationship between financial time series data. In contrast to conventional time-domain or frequency-domain techniques, wavelet analysis enables the simultaneous capturing of the evolution of correlations between variables over both time and frequency domain. This is especially pertinent in financial markets because relationships are dynamic and susceptible to structural alterations.

Wavelet Coherence

Wavelet Coherence (WTC) is a powerful tool to study the local correlation between two time series in both time and frequency domains(Joseph et al., 2015). It helps identify whether two signals move together over time and at what frequencies this co-movement is significant. It is often used in econometrics, finance and other fields where time-varying correlations are important.

$$R_{xy}^2(u,s) = \frac{|\, S\left(S^{-1}\mathrm{W}_{\mathrm{xy(u,s)}}\right)|^2}{S\left(S^{-1}\mathrm{W}_{\mathrm{x(u,s)}}\right)|^2 . S\left(S^{-1}\mathrm{W}_{\mathrm{Y(u,s)}}\right)|^2}$$

Where:
u is the time position,
s is the scale (related inversely to frequency),
$W_{x(u,s)}$and $W_{y(u,s)}$are the continuous wavelet transforms of x and y, respectively,
$W_{xy(u,s)}$= $W_{x(u,s)}$ is the cross-wavelet transform,
S is a smoothing operator in both time and scale.
This measure takes values in [0,1], where 0 implies no correlation and 1 indicates perfect local correlation at a given time and frequency.

Table 1 Descriptive Statistics

	Mean	Variance	Skewness	Kurtosis	JB	ERS (ADF)	$Q^2(5)$
Technology	0.00043	0.00015	-0.58***	9.78***	10115.26***	-10.17***	20.15***
Philippines	-0.00017	0.00014	-1.25***	14.80***	23497.07***	-26.63***	17.05***
Canada	0.00014	0.00014	-1.27***	23.51***	58304.61***	-11.49***	11.21**
Australia	0.00007	0.00016	-0.91***	8.49***	7869.67***	-13.97***	12.22**
Chile	-0.00015	0.00026	-0.75***	12.84***	17408.35***	-18.78***	22.84***
Singapore	0.00007	0.00010	-0.22***	6.97***	5081.75***	-13.79***	53.99***
Hong Kong	-0.00018	0.00013	-0.26***	4.39***	2033.74***	-47.91***	8.04
Taiwan	0.00033	0.00013	-0.59***	5.28***	3047.26***	-33.73***	8.66
Indonesia	-0.00006	0.00018	-	12.86**	17257.50*	-	26.49**

			0.23***	*	**	26.87***	*
Thailand	-0.00004	0.00012	-1.17***	17.06***	30927.56***	-19.09***	32.10***
Russia	0.00022	0.00058	-1.17***	180.44***	3395984.25***	-11.70***	498.19***
US	0.00042	0.00013	-0.81***	15.77***	26195.49***	-15.89***	71.16***
Japan	0.00025	0.00014	-0.63***	11.92***	14971.44***	-30.34***	9.28*
South Korea	0.00009	0.00014	0.08***	7.21***	5424.86***	-21.73***	6.98
Vietnam	0.00012	0.00015	-0.68***	3.90***	1778.35***	-32.81***	16.24***
Malaysia	-0.00011	0.00007	-0.24***	8.78***	8053.06***	-14.62***	46.93***
China	-0.00010	0.00017	-0.30***	4.07***	1768.01***	-10.13***	17.62***
Mexico	0.00001	0.00009	-0.48***	4.72***	2415.98***	-35.81***	7.17
New Zealand	0.00016	0.00013	-0.19***	5.11***	2739.46***	-14.31***	15.45***
Peru	0.00019	0.00027	-0.39***	8.24***	7137.49***	-14.06***	13.78**

Notes: ∗∗∗ , ∗∗ , ∗ denote significance at 1%, 5% and 10% significance level; Skewness: D'Agostino (1970) test; Kurtosis: Anscombe and Glynn (1983) test; JB: Jarque and Bera (1980) normality test; ERS: Elliott et al. (1996) unit-root test; Q2 (5): Fisher and Gallagher (2012) weighted portmanteau test.

4 Results and Analysis

Descriptive Analysis

The descriptive results indicate generally positive returns across countries, with Taiwan showing the highest mean return. Variance is low in most countries, reflecting stable returns, although some countries like Russia and Taiwan show higher volatility.Skewness suggests that most countries have a slight tendency for positive returns, with some experiencing occasional large negative shocks. Kurtosis values are high for Russia and Indonesia, indicating the presence of outliers. The JB test confirms that many countries (like Russia and Indonesia) deviate from normality, while countries such as Peru and Malaysia show more normal distributions.The ERS test suggests non-stationarity in countries like Thailand and Russia, while others, like Canada and Singapore, show more stable results. Finally, the Q(5) test indicates that some countries exhibit autocorrelation (Malaysia, South Korea), while others like Taiwan and Russia do not show significant time-dependent patterns.The data reveal interesting patterns in the financial or economic behaviors of the countries involved. While most countries exhibit stable but slightly positive returns, volatility and the presence of outliers are observed in a few regions (especially Russia and Indonesia). The results from skewness and kurtosis further emphasize that while some countries may have more frequent positive returns, others experience occasional significant negative shocks. The JB test underscores that most of the countries' data do not follow a perfect normal distribution, reflecting the complexity and non-linearity in these economies.Further statistical testing, such

as examining the reasons behind the observed volatility in countries like Russia, and accounting for non-stationarity in places like Thailand, will be important next steps in your analysis.

Wavelet Coherence Analysis Technology and APEC Countries Indices

Fig-1 wavelet coherence analysis between technology and APEC countries indices across five major global events reveals a dynamic evolution in the co-movement patterns between technological advancement and regional economic performance. This comprehensive examination spans the Oil Crisis (days 1-437), Climate Crisis (days 438-697), COVID-19 pandemic (days 1215-1601), Russia-Ukraine War (days 1734-2127), and Iran-Israel War (days 2254-2515), utilizing three distinct time horizons: short-term (0-64 days), medium-term (64-128 days), and long-term (128-256 days) coherence patterns.

During the Oil Crisis period, the coherence patterns demonstrate a fragmented technological integration landscape across APEC economies, with only select developed nations and financial hubs showing meaningful synchronization with technology indices. Singapore, Hong Kong, Taiwan, Russia, USA, Japan, South Korea, New Zealand, and Mexico exhibit significant short-term coherence, while medium-term relationships remain sparse, limited primarily to South Korea. Long-term coherence is notably weak across the region, with only China and Taiwan showing some degree of synchronization. This pattern reflects the nascent stage of digital transformation during this period, where technological sectors operated relatively independently from broader economic cycles, and advanced economies with sophisticated technological infrastructure demonstrated more immediate market responses to oil price volatility.

The Climate Crisis period marks a fundamental shift in technological integration patterns, characterized by a substantial broadening of coherence relationships across multiple time horizons. Short-term coherence hugely increases to involve Australia, Chile, Singapore, Hong Kong, Taiwan, Thailand, Russia, USA, Japan, Vietnam, China, New Zealand, Peru, and Philippines, which means the high degree of immediate technological responses to environmental issues. The medium-term synchronization also becomes more powerful, including Australia, Chile, Singapore, Indonesia, Thailand, Japan, South Korea, China, New Zealand, Mexico, Peru, and Philippines, and this pattern indicates that climate-based technological solutions started advancing the process of lasting economic integration. The incident of soundful long-term coherence in Canada, Australia, Chile, Singapore, Taiwan, Indonesia, Thailand, China, New Zealand, Mexico, Peru and Philippines shows that the environment and its sustainability issues emerged as a bottom line of technological development, innovation and performance in the economy especially among the resourceful countries and manufacturing sectors.

The COVID-19 pandemic era is a landmark in the interdependence of technology and the economy and is changing the trends in coherence throughout the APEC region by means of the fast-tracking of the digital revolution. The selective coherence span is short, but narrow on a few core economies, such as Chile, Singapore, Indonesia, Thai, Russia, USA, Japan, Vietnam, China, New Zealand, Peru, and Philippines, as they had adapted and integrated the forces of technology in an accelerated manner towards the lockdown restrictions and demand on remote working arrangements. Medium-term relationships turn out to be more focused as Canada, Australia, Singapore, Indonesia, USA, Japan, China, New Zealand, Peru, and Philippines are technologically integrated in the long run. That long-term coherence on the whole is still held across Canada, Australia, Chile, Singapore, Hong Kong, Indonesia, Russia, USA, Japan, China, New Zealand, Peru, and Philippines demonstrates that digital adoption as a result of the pandemic led to permanent shifts in the structure of how technology

contributes toward economic performance, wherein the North American economies are especially adept in adapting even when observed in the long term.

The period of the Russia Ukraine War demonstrates geopolitically motivated strategic rearrangement of technological co-movements, which is based on supply chain disruptions. Short-term coherence becomes more selective, gathering around Singapore, Taiwan, Thailand, Mexico, New Zealand, and Philippines, which implies that short-term technological reactions were influenced by geopolitical tensions, and energy safety issues. Medium-term relationships focus primarily on USA, Japan, and Mexico, indicating that sustained technological integration faced challenges from ongoing conflict-related uncertainties. However, long-term coherence remains robust across Australia, Singapore, Indonesia, Thailand, Vietnam, China, New Zealand, Mexico, Peru, and Philippines, demonstrating regional technological resilience and continued digital transformation despite geopolitical tensions, particularly evident in Asian economies.

The Iran-Israel War period exhibits the most concentrated coherence patterns, with short-term relationships limited to Singapore, Taiwan, Thailand, New Zealand, and Philippines, and medium-term coherence restricted to Australia, Singapore, and Taiwan. This concentration suggests that localized geopolitical tensions have limited immediate impact on technology-economy relationships, as the conflict's regional nature allows most APEC economies to maintain technological integration independence. Remarkably, long-term coherence remains robust across Canada, Australia, Chile, Singapore, Indonesia, Thailand, USA, Japan, Vietnam, China, New Zealand, Peru, and Philippines, indicating that fundamental technological integration has achieved sufficient resilience to withstand regional conflicts and maintain structural economic relationships.

Cross-event comparative analysis reveals several critical evolutionary patterns in technological integration across the APEC region. The temporal evolution demonstrates a progressive expansion of short-term coherence from the oil crisis through the climate crisis, followed by selective maintenance during subsequent conflict periods, suggesting that immediate technological responses have become more strategic and targeted. Medium-term coherence patterns peak during the climate crisis and COVID-19 periods, with subsequent concentration during geopolitical tensions, indicating that intermediate-term technological adaptation has become more focused on core strategic relationships. Long-term coherence shows consistent strengthening from the climate crisis onward, demonstrating that structural technological integration has become a permanent feature of APEC economic relationships.

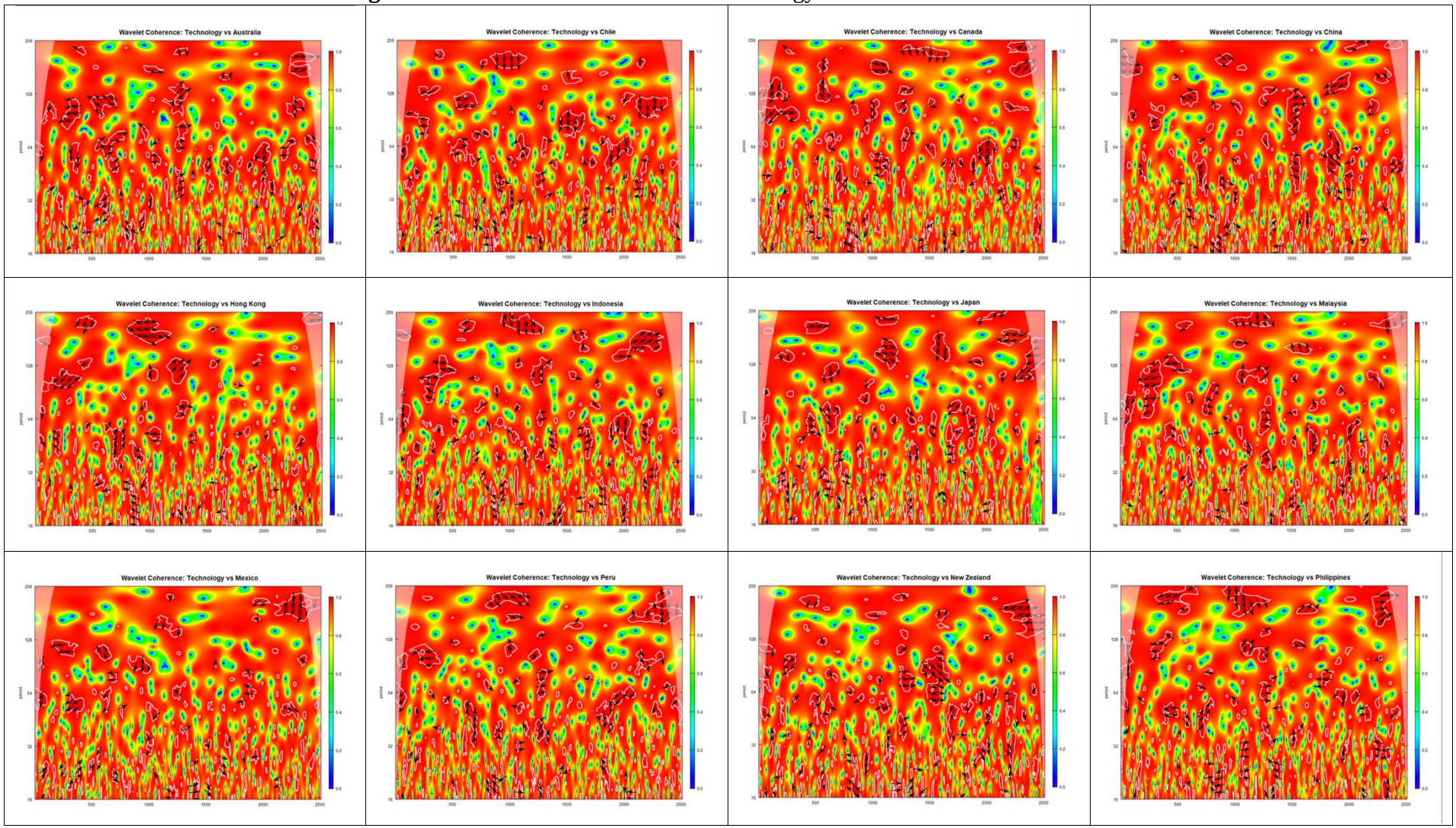
Regional clustering patterns emerge clearly from the analysis, with Singapore demonstrating consistent high coherence across all events and time horizons, confirming its role as a pivotal regional technological hub. The USA shows comprehensive coherence, particularly strong during COVID-19, reflecting its technological leadership position, while China exhibits increasing coherence over time, indicating growing technological integration and regional influence. Australia and New Zealand display remarkably similar patterns, suggesting effective regional technological coordination and shared development strategies. Event-sensitive economies include Russia, which shows coherence primarily during early events with reduced participation during later conflicts, Japan, which maintains consistent technological integration across most events, and ASEAN economies including Thailand, Philippines, and Indonesia, which demonstrate increasing coherence over time, indicating successful regional technological development initiatives.

The frequency domain analysis reveals distinct patterns across different time scales, with high-frequency coherence most pronounced during crisis periods, suggesting rapid technological adaptation capabilities to economic shocks. Medium-frequency coherence appears strongest during structural transitions such as the climate crisis and COVID-19,

indicating effective adaptive technological responses to fundamental economic changes. Low-frequency coherence progressively strengthens throughout the analysis period, reflecting the development of fundamental technological integration trends that transcend individual crisis events.

The analysis reveals three distinct phases of technological integration evolution across the APEC region. Phase 1, represented by the Oil Crisis period, demonstrates fragmented technological adoption with limited cross-border synchronization, characteristic of early digital transformation stages. Phase 2, spanning from the Climate Crisis through COVID-19, shows rapid technological integration driven by environmental and health imperatives, creating new patterns of regional cooperation and digital infrastructure development. Phase 3, encompassing the geopolitical conflicts, exhibits resilient technological relationships despite external shocks, indicating that technological integration has achieved sufficient maturity to maintain continuity through diverse challenges.

Fig-1: Wavelet Coherence between Technology and APEC Countries indices



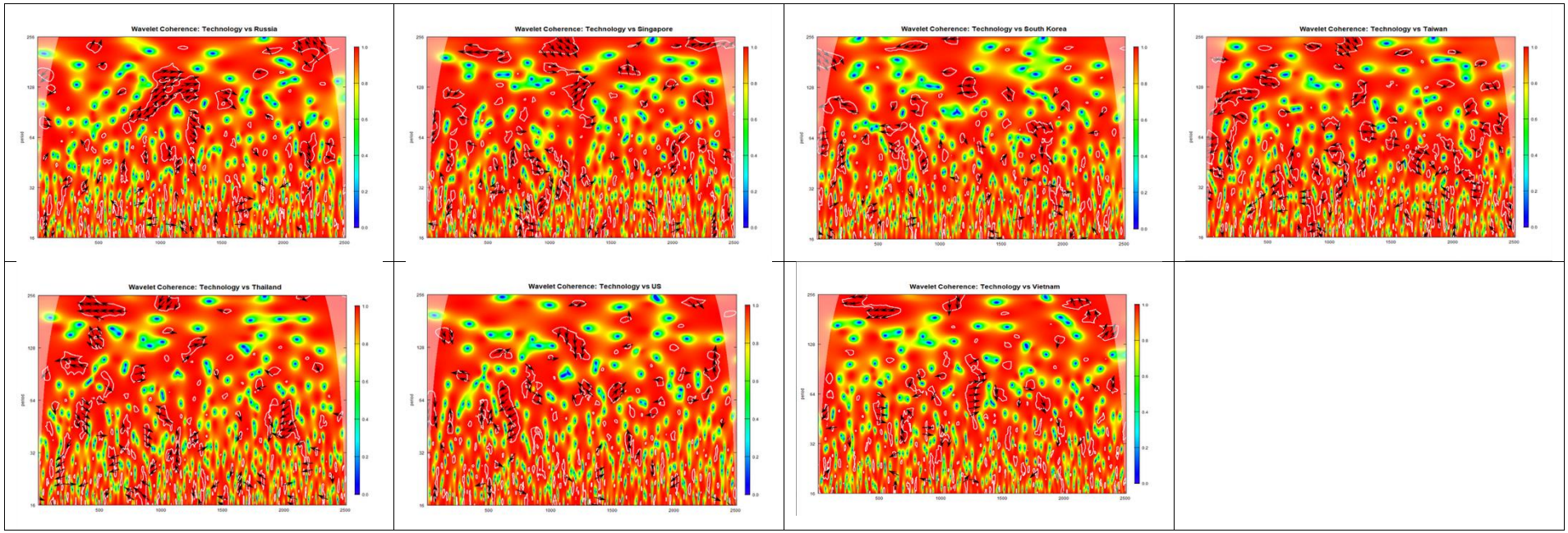


Fig. 1 Summary of Wavelet Coherence between Technology to APEC countries Indices

Variables	Oil Crisis (1-437)			Climate Crisis (438-697)			COVID -19 (1215-1601)			Russia Ukraine War (1734-2127)			Iron Israel war (2254-2515)		
	Short	Medium	Long	Short	Medium	Long	Short	Medium	Long	Short	Medium	Long	Short	Medium	Long
Canada						✓		✓	✓						✓
Australia				✓	✓	✓	✓	✓	✓				✓	✓	✓
Chile				✓			✓								
Singapore	✓			✓				✓	✓			✓	✓		✓
Hong Kong	✓			✓					✓						
Taiwan	✓		✓	✓						✓			✓	✓	
Indonesia		✓	✓				✓	✓				✓			✓

Thailand		✓	✓	✓	✓		✓								
Russia	✓			✓			✓		✓						✓
USA	✓			✓				✓		✓	✓			✓	✓
Japan	✓			✓	✓	✓	✓		✓						
South Korea	✓	✓			✓				✓						
Vietnam				✓			✓					✓			✓
Malaysia									✓						
China			✓	✓		✓	✓	✓	✓			✓			✓
New Zealand	✓			✓			✓	✓					✓		✓
Mexico	✓				✓					✓	✓				
New Zealand	✓			✓			✓			✓					✓
Peru				✓			✓	✓				✓			✓
Philippines		✓		✓			✓	✓	✓				✓		✓

5. Conclusion

The wavelet coherence resultsshows that an essential shift happened to the relationship between technology and economy in the APEC nations over the descriptive term. This gradual shift in the centrality of technology in the processes of regional economic integration can be reflected in the manner in which the process of regional economic integration has been at the center of the processes of technology acquisition and implementation during the oil crisis, which were patchy, but highly unified as witnessed in the recent conflicts. Even when in the short and medium-term there are disruptions to coherence in long-term development within different economies, the continued coherence over the long period seems to reveal that the integration of technology has now become a structural characteristic of APEC economic relationship and that it has created a basis to economic resilience, coordination, and sustainability of the economies of APEC. This development has opened up other prospects in regard to policy coordination, investment planning, business planning in the APEC area, and has set technological integration as a key element in the stability and growth in the region. The evolution between the scattered technological usage of the oil crisis to the strengthened, well-aligned harmony of the recent conflicts shows how the main focus of technology in the economic integration of a region keeps increasing. The fact that the long-term coherence has been achieved in a variety of economies, regardless of the short-term and medium-term shocks over the same period implies that APEC economic relationships became structured with technological integration. It can be concluded that although short-term crisis management capabilities may be uneven among nations and along time frames, there is a gradual strengthening of the underlying technological integration, which offers the basis of economic resilience and coordination in regions. Such trend has deep policy coordination and investment behaviour as well investment planning implications in the APEC region.

The economic and policy implications of such findings are extensive and many. To policymakers, the enhancement of long-term coherence implies that technology policies need to focus more on long-term sustainable integration plans and policies respectively other than the imminence of crisis response, in an observation that emphasizes on the growth of robust technological infrastructure that can sustain regional organisation regardless of challenges. The fact that the expression has remained coherent despite variety in different economies means that technology-driven strategies of investment must pay attention to regional patterns of integration and long-term structural trends instead of a short-term volatility in the market. The changing nature of fragmented to integrate coherence implies in the case of businesses that the adopted technological approaches must shift the focus to regional coordination, sustainability over the long term, and building technological capacities that hold enjoy potential effectiveness in various economic and geopolitical settings.

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