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BOOK REVIEW

Sugata Marjit, Biswajit Mandal, and Noritsugu Nakanishi: Virtual trade and Comparative advantage: the Fourth dimension

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Gouranga G. Das[1]

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'Timing' is everything. However, pivotal role of time in economic analysis can no way be exaggerated. According to Hicks (1979): "*The economic system has now to be conceived of, not merely as a network of independent markets, but as a process in time (p. 116).*" Given this central role of time, it has not been given due importance except in some areas like household decision-making (Becker 1965) or, overlapping generation models, etc. International trade is a less-traversed area as popular trade models do not usually consider '*time-dimension'* even when globalization involves global integration of nations *across separate time-zones*. We can no way set aside the tremendous spurt in economic activities, trade and transactions, in the online platform or virtual world, which should radically transform the way we should think about international trade. In fact, with Covid-19 pandemic and regulations for social-distancing virtual activities–replacing physical transactions–have become backbone of major transactions. This is enabled by Information and communication Technologies (ICT) or 'digitalization' induced virtual trade (VT, henceforth).

We, the *Homo Economicus,* are located apart (distant or, in close vicinity) in different geographical regions or time zones (TZ, hereafter). Since the days of hunter-gatherers, people organized production by transporting and trading commodities spatially. Different waves of globalization and technological breakthrough (steam engine, locomotives, or electricity) have shaped commerce between nations (Baldwin 2016). With global integration and emergence of third industrial revolution (via ICT) and concurrently, the fourth one (artificial intelligence (AI), machine learning, or so), taking advantage of these could be gainful if the TZ-differences are optimally utilized to bridge the geographical barriers. Marjit, Mandal, and Nakanishi (M–M–N, hereafter) dealt with these issues in this impressive book in a cogent analytical framework. They employ Neo-Classical micro foundation of modern trade theory and extend it by making a clear point of

✉ Gouranga G. Das
dasgouranga@gmail.com

[1] Hanyang University, Seoul and Erica Campus, Ansan, Gyeonggi-do, South Korea

departure from its precursors. It is a timely contribution to illuminate us on such insights. No doubt, it will enrich not only literature on international trade, but also researches in the areas of decision-making of any kind where 'time' plays key role. 'Time' as a 'trade barrier' involves transaction costs of various forms. As transaction and communication costs nosedived due to the benefits of ICT and 'timeliness of delivery' matters, consideration of "Time" as a pivotal element in international trade is essential. For example, with rise to dominance of global value-chain in an ever-expanding production network across geographically separated TZ, role of time for organizing production across space cannot be undermined.

According to the authors (ibid.), *"Virtual trade, simply referred to as transactions that do not involve physical transfer of good and services, is the core economic activity of the world as we see around us. In the standard parlance of trade theory countries that are exactly identical in all respects can gain from trade just being located in two non-overlapping time zones."* Emergence of services trade opens the door for exploitation of non-overlapping TZ-differences, while timing of production matters, as consumers' prefer timely delivery. Organizing multi-stage production across multiple countries involves utilization of 'time-difference' and coordination (and synchronization) of such fragmented activities along with reducing delivery cost. Thus, trade in services needs explicit analysis beyond conventional paradigm to show how TZ-differences could act as a major catalyst behind VT. This book exactly does that with an entirely new mechanism by incorporating 'TZ-difference' as a source of comparative advantage—a paradigmatic shift beyond the traditional corpus of Neo-Classical and Classical trade theory *encompassing three dimensions*, viz., technology (labor-productivity), resource endowments, and preference for variety as determinants of trade.

As the author rightly claims in Chapter 1 (introduction)[1]: *"Usual determinants of trade are technology, endowment, and preference. Apart from this we have a fourth dimension—imagine a world where two identical countries located in two non-overlapping time zones and working in a virtual network could effectively engage in trade and gain."* Here, two otherwise identical nations (in terms of endowments, technologies, and 'love' for variety) will engage in trade to take advantage of 'natural' locational position in non-overlapping zones via organizing 'shift works' across dawn (morning) and dusk (night). For example, trade emerges between say USA and Japan because they have comparative (dis)advantage in day (night) and vice versa for the same goods and services, and that induces them to trade mostly in services (viz., financial or customer services such as call centers, etc.). Such gainful effects are discussed in Marjit and Yang (2021). Extent of overlap—extremely distant non-overlapping being situated in opposite sides of globe (like North America or Western Europe vis-à-vis East or South Asia) or, partially overlapping ones (North America vis-à-vis some of Western Europe, or East Asia and South Asia)—matters for taking advantage of TZ-differences, and realizing such gains. Taking advantage of such TZ-based 'natural' comparative advantage—by dint of ICT—reduces production period by half. Hence, distance could promote trade, gains

[1] Ibid.

from trade (GFT, hereafter) and welfare via virtual division of labor. This is novel in its approach and unique in terms of dealing with virtual exchange.

Thus, contrary to popular workhorse empirical Gravity model, a key result is that greater physical distance does not necessarily deter trade; rather it encourages trade by opening windows of opportunity for organizing global production, causing 'death of distance' via utilization of such 'natural' comparative advantage. In a way, it challenges the empirical gravity model (negative) estimates of the impact of distance on trade flows and further intrigues us about the missing globalization puzzle (true effects of global integration) or distance puzzle (Yotov 2012). Moreover, as VT does not require physical presence of suppliers-demanders at the same moment, apprehension of de-globalization or backlash on global production network could take a backseat with high bandwidth telecom infrastructure network.

Starting from the background overview penned down in two chapters in Part I (i.e. grand design of the ideas), the book has five parts. Part V (Chapter 14) concludes by discussing the scope of further extension. Part II (Chapters 3–6) is the most important one as it provides the workhorse theoretical models of VT. Parts III (Chapters 7–10) and IV (Chapters 11–13) are theoretical extension of insights developed in Part II, to discuss trade-growth-distribution nexus, skill formation, FDI and firm-heterogeneity respectively.

Chapters 3–6 discuss the point of departure from the popular trade models and add the *fourth dimension, i.e. TZ-differences.* It involves trade in intermediates or final services (essentially labor services or tasks) across countries. In the process, it reduces untimely delivery of goods and services as consumers value time–cost of consumption. Marjit (2007) is the most important contribution, which culminated into the model in Chapter 3 using a Ricardian framework with two-country-two-good setup where one good production requires sequential stages of production fragmented (outsourced) into other geographical location. The otherwise identical countries specialize in one stage, and do trade (without transshipment cost) with accrual of GFT due to TZ-differences. Further generalization with a continuum of production stages is also developed.

Chapter 4 is extension of the standard Heckscher-Ohlin-Samuelson (HOS) model—incorporating one skilled-intensive 'service good' produced in stages, one standard good, skilled labor and capital–to show emergence of services trade between two TZ-differentiated countries, thanks to ICT-led benefits shortening the production time. With rise in production of the skilled-intensive service (taking 'natural' endowment of TZ), skilled wage rises at the cost of rent income depending on typical general equilibrium factor-intensity effects.

Within imperfectly competitive market—unlike in Chapters 3 and 4–Chapter 5 introduces TZ-differences in a model with three-economies situated in non-overlapping TZ. With three goods (two consumption good and one differentiated intermediate business service used in production of final good) and labor as only primary input, it is shown that GFT occurs due to trade in intermediate services facilitating production of the final good. Based on the notion of 'discount factor' and preference for timely-delivery, the model captures the boons of virtual connectivity, such as, lower price of final commodity, increase in output and number of firms in

post-trade equilibrium. Relative cost of outsourcing of unfinished intermediate input or ICT-cost vis-à-vis the benefits of early delivery is crucial determinant for final production cost.

Chapter 6 is rebuttal of gravity model to show that distance does not impede trade. Benefits of utilizing TZ-differences are maximum with non-overlapping trade partners due to cost-efficiency and shortening of production (and delivery) time for final consumption. Two important ideas—inverse relationship between extent of delay in delivery and consumers' valuation of the good, and time preference depending on physical distance— emanate from a model with production function of Services output using capital (and capital accumulation) and intermediate input. It demonstrates that VT increases production and trade, and consequently leads to output growth via further capital accumulation. Exploiting TZ-differences based on day-night cycle of production and services trade via usage of ICT-enabled services speeds up global integration and growth based on sheer 'complementary' natural comparative advantage. Thus, both nations can take advantage of this 'natural endowments' of longitudinal differences causing day-night cycle, and workers can share workload in the value-chain by making the production run for 24 h' cycle. In one sense, VT has impacts alike 'time-saving' technical progress reducing 'iceberg' type transaction costs.

Based on these theoretical frameworks, Part III deals with growth impacts (endogenous). There are voluminous researches emphasizing the role of trade-led innovation, technology flows, skill (human capital), etc. However, the traditional workhorse models of trade seem quite inadequate in terms of dealing with the dynamic aspects of long-run growth, rather than focusing merely on resource allocation and welfare aspects. In chapters 7 and 8, developing a variant 'AK' model structure based on VT, M-M–N shows how ICT-led benefits could induce growth based on network effects, and services (intangibles) eventually embedded in a physical product (tangibles). Thus, VT catalyzes growth process by dint of extending the 'effective' working hours. Modeling an entirely different mechanism, Chapters 7 and 8 discuss these aspects for permanent (sustained) improvement in productivity due to advantages of 'round the clock' production aided by time-saving and trade-augmenting impacts, and terms-of-trade improvements. Four interlinked factors—communication network effects, terms-of-trade effects, efficient resource allocation effects, and investment rate impacts–play pivotal role here. Chapters 9 and 10 shift focus on factor markets, factor prices, and distributional impacts by developing alternative models like specific factor model with land, labor, and capital, and heterogeneities in preferences for shift-work in day and nights. Differences in country size play crucial role here as wage premium for night shift occurs in the large country case unlike in the small country where it disappears. VT could eliminate cross-country wage premiums for equal-sized countries. For large country, night shift might continue with resultant rise in wage premium for the skilled workers. Depending also on the country size, dices are loaded in favor of large country landlords. Incorporating night and day shift works and its implications for the skilled-unskilled labor, i.e. rise in wage premium as well as aggregate income due to increased specialization in day-shift work is a novelty.

Drawing on the preceding parts, Part IV introduces special topics such as, skill formation, demand for educational services, firm heterogeneity and FDI. Chapter 11's contribution is to model.

TZ-differences and ICT-networks for trade to wrap-up unfinished work, along with skilled-unskilled labor splits, and to furnish that both types benefit at the cost of capital owners. With higher returns for educational capital, foreign education capital inflows, increases skill, inflates skilled-unskilled wage gaps. In contrast, Chapter 12 deals with cross-border financial capital flows between distant trade partners emphasizing the case of loss incurred owing to non-utilization of such capital; further, it explores the prospect of shifting it with unfinished jobs in another location to deliver benefits compensating the loss. Of course, interest-rate differentials play role. TZ-utilization reduces the loss with idle capital. Practical aspects of such capital-shifting is insightful for modeling production of service activities requiring 24 working hours. Net benefit of such financial capital movement is of utmost consideration as it affects the wages due to general equilibrium adjustments. Chapter 13 offers a brief overview of the current firm-heterogeneity literature. Subsequently, a two-country-two-good model is developed to show counter-intuitively that in case of '*differentiated*' services production in monopolistically competitive firms, more productive foreign subsidiary of heterogeneous firms engage in FDI, export unfinished services overseas and imports finished products back home. *Without* wage differential, here trade occurs to reap advantage of fall in communication costs generating an unconventional trade pattern.

However, no research is ever complete or perfect. One research opens the doors for further investigations into new domain, keeping the field alive for active researchers. Similarly, this valuable contribution also leaves several fertile terrains to be cultivated (Chapter 14). Four such immediately comes to my mind. One pertinent area could be analysis of organizing night shift-day shift works and proliferation of call center activities in countries like India or Philippines with large sections of English-speaking professionals. Secondly, how VT affects employment and nature of skill-unskilled relationship, inequality, and role of human capital formation. Thirdly, regulation of virtual markets with the emergence of big tech firms like Facebook-Amazon-Netflix-Google (FANGs), Google-Amazon-Meta (Facebook)-Apple (GAMA) or, Baidu-Alibaba-Tencent-Xiaomi (BATX) is necessary as policy makers need to pay attention to privacy protection, quality control, and global cooperation for shaping trade agreements (see McCalman 2021). Fourthly, empirical extension of Gravity model via further theoretical foundations based on VT (as well as domestic online trade) and incorporating virtual transactions will bolster empirical basis of such insightful models.

Although the word "Virtual" at a first glance refers to something unreal, this has become more "real" now. M–M–N captures this reality elegantly. All these chapters are quite well written with full lists of chapter-specific references along with the Appendices for further elucidation. This would generate more research as 'Time' is our greatest resource without any illusion. With this perspective, this book should find place in every shelves of academic institutions where researchers can get foods for thoughts and generate more fruitful research topics. In fact, teasing out essence from these theoretical developments in the book for the advanced

undergraduate would prepare the next generation of students to look outside the black box. It is also valuable for the policy makers. With emergence of '*linking-technologies*'--linking labor, zones, ideas, and services—this book is a *sine-qua-non* for those working in the areas of supply chain, services trade, and production networks. Under the long spell of Covid-19-induced social distancing, given the fact that the menace is yet to be over, VT based on bandwidth of ICT networks is a *tour-de-force*.

Leonardo da Vinci (1452–1519) said: "*He who loves practice without theory is like the sailor who boards ship without a rudder and compass and never knows where he may cast*." This book will show the reader how to tread the path in the right direction while analyzing trade in an era with voluminous data on online transactions, virtual communications and tools such as machine learning, AI, and ICT are affecting domestic and international trade. Researchers can mount empirical analysis—using sophisticated tools, data analytics, etc.—to further this fertile area of research. M–M–N ignited the lamp by providing the theoretical mechanism couched in a lucid framework, and should be congratulated for this magnum opus demarcating a clear path away from orthodoxy.

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