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BOOK REVIEW

Marjit, S.; Mandal, B. and Nakanishi, N.: Virtual Trade and Comparative Advantage: The Fourth Dimension

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Both, time (generally) and timing (specifically) are extremely crucial in economic analysis. This message has been put forth authoritatively by this book, whose advent itself is very timely.

Conventionally, heterogeneities in technology, endowments and preferences have been considered as the bases of international trade, as observed by large number of contributions. The said three bases largely explain international trade (in goods and services & inter/intra industry) among the trading partners. In a rapidly globalizing world, where nations are located across separate time zones, the role of *time* has not been considered in standard trade models. This book, however, brings forth an extra, apart from the above three, the fourth dimension: the time zone differences among the nations, as yet another (novel) basis for (international) trade.

The said new (time) dimension has spawned from the advancements in the information and communication technologies (ICT) in the recent past. Nations homogeneous otherwise (in terms of the other bases of international trade) can possibly still trade if they are located in non-overlapping time zones. As a simple case consider two countries located on the opposite sides of each other on the globe. The location of the countries may lead to comparative dis/advantage for them, depending upon time (as day time for one would imply night time for the other), for the same good; hence the possibility of trade between them. However, this would be trade in services (facilitated by information and communication technologies (ICT)), hence the authors coin the term *virtual trade* (*VT*).

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Our recent experience with the regulatory responses induced by the Covid-19 pandemic across the globe has shown that virtual activities enabled by ICT have replaced physical transactions to a large extent and *virtual* has become more *real* than the real.

The world in general has witnessed a lot of progress as in technological breakthroughs and how the same has led to varying waves and degrees of globalization and commercial transactions among nations world over. We have umpteen numbers of examples of virtual trade in the contemporary time frames, ranging from financial services to customer services provided by the business process outsourcing (BPO) sector through back office or call centres the world over. With enhancements in the ICT and advent of the artificial intelligence (AI) the time zone differences among the nations become more crucial and optimal utilization of the same could be highly beneficial. However, in this sub-filed of international trade which is still in its nascent stage but growing at a rapid pace, various aspects relating to (virtual) trade and the role of time need to be addressed/analyzed. The book in question, aptly fills this gap in the literature, in a cogent analytical framework.

The book is laid out in five parts. Part I comprising of the first two chapters contains the background overview while Part II, containing chapters 3–6, analyses the patterns of trade induced by the time zone differences. Parts III and IV containing chapters 7–10 and 11–13 respectively, extend the insights developed in Part II, and focus on trade, growth and inequality and firm heterogeneity, FDI and financial capital respectively. Part V containing chapter 14 concludes and shows the road ahead.

Starting with the Recardian model, Part III is chronologically structured. It discusses the departures from the standard trade models and introduces the *fourth dimension*. Chapter 3 shows how time zone differences lead to comparative advantage. Specifically, it uses a two country—two good set up in a Recardian framework where the production of one good requires sequential stages in production fragmented into other (geographical) locations. It shows how two countries located in two different (non-overlapping) time zones but identical otherwise can trade and benefit thereof due to the *fourth dimension*, i.e., time zone differences. The above mentioned Recardian set up is also generalized with a continuum of production stages.

Chapter 4 starts with another workhorse of international trade theory, the basic Heckscher–Ohlin set up. Using the 2×2 general equilibrium framework, where both the goods use skilled labor and capital as inputs, it shows how the advent of ICT (through reducing the production time) enables trade in services, among nations located across time zones and explains the effect of trade on factor prices and output. In this framework, one of the goods is a service good, which is skilled labor intensive and involves two stages in its production process. The results show that the wage of the skilled labor (rent) rises (falls) conditional upon the factor intensity assumptions. However, it is shown with regard to output that, independent of the said factor intensity assumptions, the sector exploiting the time zone difference expands while other one shrinks.

International trade literature has also focused on imperfect markets structures, especially monopolistic markets. Following a similar line of thought developed in the last two chapters, Chapter 5 using a monopolistically competitive framework analyzes time zone induced trade. It introduces time zone differences in the model where there are three economies situated across non-overlapping time zones. There are three goods [two traded consumption goods and one tradable intermediate service (a differentiated intermediate business service used in the production of the final good)] and labor is the only primary input. The intermediate good requires two stages of production. It is shown that, conditional upon the benefits due to time zone differences being greater than the cost of outsourcing the intermediate business service or the ICT, virtual trade in the said intermediate services (enabling production of the final good) can take place due to the time zone differences.

In contrast to the main idea of the gravity model, Chapter 6 argues that distance does not necessarily hamper trade. It deals with the effect of distance on the trade potential for countries located in non-overlapping time zones. It is shown that as advancements in ICT reduce the cost of virtual transaction of services there may be increase in the production and volume of trade, implying that distance positively impacts trade volumes. It is also shown that exploitation of the time zone differences enhances welfare and leads to capital accumulation.

Part III analyses the impacts of virtual trade on economic growth and inequality. Chapters 7 and 8 develop a variant endogenous growth model based on virtual trade. Chapter 7 highlights business-services trade (benefiting due to the time zone differential) as the reason for economic growth. It shows how tapping the time zone differences can lead to faster economic growth via terms of trade improvement. It is worth noting that the said economic growth would materialize even in absence of technical progress. It is also shown that acceleration in trade of intermediate business services (producible in different time zones) may have permanent impact on productivity. Chapter 8 shows that trade positively impacts the growth rates of the two trading partners beyond the level effect. Considering virtual trade in intermediate business service, induced by non-overlapping time zones, it is shown that trade increases the equilibrium optimal growth rate. In this set up, trade impact going beyond the level effect, induces growth. In essence, virtual trade leads to economic growth by increasing the effective working hours (round the clock).

Chapter 9 works with virtual labor mobility and distributional and allocative impacts thereof. It develops a specific factors' model where the trading partners are located in different time zones and highlights how trade in labor services (via communication networks) impact patterns of production and factor prices. It shows that if the trading countries are equal in size then free trade in labor services leads to wage (and other factor price) equalization (in both the countries). Rental rate of capital (land rental rate) increases (decreases). The same does not hold if the trading countries differ in size. In the larger (smaller) country wages for night-workers are higher (lower) than that of the day-workers. In the larger country night shift remains while it disappears from the smaller country.

Time zone differences, service trade and implications for factor prices are the focus Chapter 10. Incorporating the (day and night) work shifts in the analysis and highlighting the implications thereof, i.e., with regard to skilled–unskilled wage differential, is an interesting novelty. The results show that virtual trade may increase the wage premium for skilled labor and enhance the aggregate income due to increased specialization (in day-shift work).

Part IV considers foreign direct invest in context of homo/heterogeneous firms, with possibility of business process outsourcing via time zone differential. It also considers demand for educational services and skill formation. Through a trade model incorporated with time zone differential and ICT, Chapter 11 examines the effects of time zone differences on factor prices and sectoral composition. It shows that virtual trade is beneficial to skilled labor. This increases the skilled–unskilled wage gap, leading to inflow of educational capital from abroad in turn altering the sectoral composition and changing the economy into one with enhanced skill base. Chapter 12 considers international financial capital flows among trading partners located across the globe, separated by non-overlapping time zones. The emphasis is on the costs incurred by producers due to capital remaining idle and unused overnight. It highlights that the movement of the said idle capital along with the unfinished jobs to destinations across non-overlapping time zones may be beneficial for the producers. Thus, proper exploitation of the time zone differential reduces the said loss to the producers due to idle capital. Obviously, the interest rate differentials also have their role and impacts with regard to the above said capital movement. Considering production of services round the clock and analyzing impacts of such capital movement is yet another novelty. The chapter also analyzes the impacts of such capital movement on wages.

The book considers firm heterogeneity in the penultimate chapter, i.e., Chapter 13. This chapter starts with briefly highlighting the current international trade literature focusing on firm heterogeneity. It goes on to develop a two-country two-good model with firm heterogeneity and examines whether productivity affects trade patterns via utilization of time zone differentials by the trading partners. The market for one good is perfectly competitive while that for the other one (differentiated services) is monopolistically competitive. It is shown that even in absence of wage differential a reduction in the cost of ICT may lead to trade in unfinished and finished services. Thus an unconventional trade pattern emerges due to a reduction in the communication costs. It is also shown that the more productive monopolistically competitive (heterogeneous) firms engage in FDI activities, outsource unfinished services and import finished products.

Chapter 14 contains the concluding remarks while also showing the way for future potential research. The *fourth dimension* and ICT could impact a range of activities (such as commerce, taxation and fiscal policy) of potential interest to the policy makers. Clearly, this book is a very important contribution, which successfully and elegantly introduces and establishes time as a new dimension for trade. Models developed in the book highlight and reinforce the role of time in international trade. While being an original and excellent source, with regard to the role of time in international trade, this book is also illuminating through its rich theoretical models operating in lucid and realistic frameworks. An outstanding and attractive feature of the book is extremely well written (to the point) chapters with chapter specific reference and appendices at the end of the chapters, having the potential to save time and generate some (positive) surplus for the reader(s), which we may call *readers' surplus*. The book would be of immense value for policy makers, researchers and students alike.