<u>Response to Reader's comments</u>

First of all I would like to thank you for reading the paper and commenting on the issue I raised. I have gone through your comments and tried to accommodate some of the points. Your FTA argument is really very good and I shall definitely try to look at the interrelation in detail in future. My detailed responses are as follows:

1. The basic point about gains from cross-time-zone trade is right, though previously made by Marjit and others.

   <u>R#1.</u> In the introduction of the revised draft I have tried to make it clear why and how this note is different from the existing papers (pp 5).

   By this time it is, perhaps, clear that total volume of trade has two components: physical trade and virtual trade. Physical trade falls with distance. But my focus in this note is on the relationship between virtual trade and distance. The idea of virtual trade is essentially trade in services or trade in labor tasks that can be exported and imported back via internet. This part is relatively less explored. So in this note I strive to add some value to the existing literature which is yet to be highly researched. In doing so I attempt to relate physical distance influencing (non-) overlapping time zones between two trading partners with virtual trade. Notice that this kind of trade becomes a central issue of research only after information technology revolution. So a reduction in the cost of communication is the primary driving force for virtual trade. Hence I start with a negligible cost of communication.

   The world being circular, time zones are essentially the reflection of aerial distance. Therefore, in a finer sense distance between two places are exhibited by the difference in time zones or calendar dates. And, hence, in the hindsight of time zone and trade literature there is physical distance that triggers virtual trade positively which is quite contradictory with the standard 'distance and goods' trade' arguments. Taking clue from this baseline wisdom I move forward to check how distance can impact on volume of production and trade. Then I briefly attempt to look at if such kind of trade caused by difference in time zone which in turn led by distance may induce any change in capital accumulation or output growth.

2. The basic model could be cleaned up a bit because it inserts capital in the production function but removes it from the cost function by assuming that its rental rate is equal to zero.

R#2. Assuming a positive cost of capital would not yield any qualitative difference in the results and analysis. However I agree that this can easily be done.

3. The zero price of capital makes the attempt to move from static trade theory to capital accumulation quite dubious. If growth is to be treated seriously, the static model should incorporate a positive price of capital.

R#3. I have just hinted at the physical capital accumulation which is primarily triggered by distance related time zone differences. I agree that a full-fledged growth model requires more detailed analysis. But I have not done that since Kikuchi and Marjit (2011) framed a growth model due to time zone difference. But theirs was more mathematical than intuitive. Here I briefly pointed at how distance lead to capital accumulation and hence output growth. Nonetheless, the difference with Kikuchi and Marjit (2011) is provided in footnote 1 of pp 6.

Kikuchi and Marjit (2011) is concerned about how growth is associated with time zone difference. They formulated a dynamic model of growth following AK structure where it has been argued how exploitation of time zone difference through communication network can lead to growth for both the trading partners simultaneously. But they did not consider the distance issue explicitly. So their paper was based on growth theory and focused on productivity concern. In this note I borrow the simple Cobb-Douglas production function that had been used in Kikuchi and Marjit (2011) and then invoke the issue of distance captured by difference in time zones.

4. The paper does not sufficiently stress in various places that it applies to what it calls 'virtual' trade exemplified by a special type of services trade such as call centers and the like. This could mislead casual readers.

R#4. I have modified the note and done required changes to focus on "virtual trade". In fact I have also changed the title of the note which is now "Distance, Production, Virtual Trade and Growth – A Note".

5. Looking to future implications, the gains from virtual trade being larger for partners far enough away to have disjoint working days suggests a new dimension to efficient free trade areas. The existing ideas about FTA formation are based on trade costs increasing in distance. Thus proximity is associated with greater likelihood of trade creation exceeding trade diversion, a presumption from theory that jibes with the geography of most actual FTAs. The rise of services trade, and thus of potential gains from cross-time-zone trade, suggest a contrary force is rising in importance. Related to this, the relative desirability of FTAs vs. full multilateral agreements is probably modified.

> **R#5.** I am extremely thankful for this argument. I am in complete agreement with you. However, I have not done any extension here, but hope to do it later though I indicated (in the concluding segment) this possibility as a very interesting application. (pp 11)

> *The basic results of the paper may have some interesting implications for the existing FTA (Free Trade Agreement) literature. Conventionally, ideas about FTA formation are primarily based on trade costs increasing in distance implying higher probability of forming FTA and trade creation if the partners are located in close proximity. Whereas, an increase in service trade, and thus of potential gains from cross-time-zone trade, suggest a contrary force in importance. Therefore virtual trade analysis following geographical distance and time zone differences may come up with some interesting dimensions for the formation of FTA.*

References

Kikuchi, T. and S. Marjit, (2011) "Growth with Time Zone Difference", *Economic Modelling*, 28, 637-640.