Indian Institute of Foreign Trade
WORKING PAPER

No. EC-20-43
October 2020

Labour, Trade, and Wage Inequality
Some New Results

Manoj Pant
Sugandha Huria

Working Paper Series

Aim

The main aim of the working paper series of IIFT is to help faculty members share their research findings with professional colleagues in the pre-publication stage.

Submission

All faculty members of IIFT are eligible to submit working papers. Additionally, any scholar who has presented her/his paper in any of the IIFT campuses in a seminar/conference will also be eligible to submit the paper as a working paper of IIFT.

Review Process

All working papers are refereed

Copyright Issues

Keys to the first two digits of the working paper numbers

GM: General Management
MA: Marketing Management
FI: Finance
IT: Information and Technology
QT: Quantitative Techniques
EC: Economics
LD: Trade Logistics and Documentation

Disclaimer

Views expressed in this working paper are those of the authors and not necessarily that of IIFT.

Printed and published by
Indian Institute of Foreign Trade
Delhi Centre
IIFT Bhawan, B-21, Qutab Institutional Area, New Delhi – 110016
Kolkata Centre
1583 Madurdaha, Chowbagha Road,
Ward No 108, Borough XII, Kolkata 700107

Contact
workingpapers@iift.edu

Labour, Trade, and Wage Inequality: *Some New Results*

Manoj Pant[1] and Sugandha Huria[2]

Abstract:

This paper reassesses the link between labour, trade, and wage-inequality by proposing a simple modification of the standard 2-sector model with wage differential by incorporating the importance of consumption time. Emphasising the point that outsourcing of this time is limited by a country's demographics, unlike outsourcing of production, which is restricted by both geography and technology, we focus on the role of a household sector that enables formal sector workers to monetise their time utilised in completing irksome household tasks by outsourcing them to unemployed-unskilled workers available in the labour market. The introduction of this sector alters some of the conventional results in the trade theory. In particular, we show how an increase in household labourers' supply unambiguously benefits formal skilled and unskilled workers, without affecting their gross earnings and production activity, though net income-inequality rises. However, the effect of trade on wage-inequality depends on the extent to which the formal sector workers can free up their time by hiring household labourers. Our framework also questions the cornerstone of the traditional results on trade and wage-inequality based on H-O-S type models and shows how one can explain the simultaneous increase in wage-inequality in developed and developing economies around the world.

JEL Codes: F11, F16, F22
Key Words: Labour, Immigration, Trade, Wage Inequality, Household sector

1. Introduction

The link between globalisation and wage inequality has always been at the centre stage of policy debates in almost all the economies around the world. While in the past few years, inter-country wage-inequality between similar (income) classes of individuals has started witnessing a decline (specifically, after the rapid growth of the Chinese economy),[3] intra-country inequality between different working classes has always been on the rise in both the developing and developed nations since the early 1980s (Qureshi 2018; UN DESA 2020). This is despite the fact that trade has been booming throughout the late 90s and early 2000s powered by the rise of GVCs, except after 2008 or so when the world economy experienced a slowdown in its activities.

[1] Indian Institute of Foreign Trade, New Delhi-IN. Email: <mpant101@gmail.com>, <diroffice@iift.ac.in>
[2] **Corresponding Author.** Jawaharlal Nehru University, New Delhi-IN. Email: <sugandhahuria@hotmail.com>, Contact Number: +91-98110-56512
[3] UNCTAD (2014)

Trade theorists have often tried to reconcile this empirical finding with the Heckscher-Ohlin-Samuelson (H-O-S) theory[4] by exploring new mechanisms and reformulating the standard models based on specific characteristics of countries, industries, or even firms. For instance, studies by Acharrya and Marjit (2000), Marjit and Acharrya (2003) have modelled the role of informal markets and non-tradable sectors, and those by Beladi and Batra (2004), Gupta and Dutta (2010), and Barua and Pant (2014), among others, have attempted to address the issue by incorporating the role of specific factors of production, intermediate goods, and unemployment in labour markets within the H-O-S framework. Besides, others have also emphasised on the importance of firm-heterogeneity and product fragmentation/outsourcing (Yeaple 2005; Unel 2010; Tran 2020), foreign direct investment (Gopinath and Chen 2003; Huria and Pant 2018 etc.), and migration policies (for e.g., Yabuuchi and Chaudhuri 2007) in models of trade to explain the global rise in wage inequality.

However, the review of the literature suggests that these views have often been contested by those who argue that the phenomenon of rising wage inequality has more to do with technical advancement, rather than trade per se. For example, Katz and Murphy (1991), Bhagwati and Dehejia (1993), Ghose (2000), Lu (2000), Zhu and Trefler (2005), and Mollick (2008), *inter alia*, have emphasised that it is actually the skill-biased technical progress or the shift towards skill-intensive goods (or capital-intensive goods that are more complementary to skilled than to unskilled labour) that increases the skilled wage rate at the expense of the unskilled wage rate by displacing unskilled jobs and hence, accounts for the majority of the global rise in wage inequality. Similar arguments have been put forward in relatively more recent studies by Reenen (2011), and Autor and Salomons (2018), as well.

Unlike the studies that focus either on trade or technical progress, Zeira (2007) has attempted to model the role of the two competing factors together in a unified framework. Considering a world with one final good and many intermediate inputs (produced using two alternative technologies, one by skilled and the other by unskilled workers), the author has shown how the rising income gaps could be attributed to technical improvement (and not just trade) in both the developed and developing countries. In a similar vein, Chowdhary (2010) has explained how this gap arises because of technical progress induced productivity differences between the skilled and unskilled in the North. This is because the outsourcing firms from the North, utilise

[4] In a 2-country, 2-sector world with skilled and unskilled labour, application of the H-O theory along with its corollary (the Stolper-Samuelson theorem) predicts that trade should lead to a rise in wage inequality in the skilled-labour abundant developed country, while reducing it in the unskilled-labour abundant developing country.

the same improved (skill-biased) technology everywhere, i.e. they transfer the improved technology to the firms in the South. In a different framework, Feenstra and Hanson (1995) have also shown how outsourcing of basic stages of production that are relatively unskilled labour intensive from North's perspective, but skilled labour intensive as per the South, raises wage inequality in the latter. Leung (1998), however, has argued that the relative demand-bias for a good in a particular country (i.e., non-homothetic preferences) assumes a crucial importance in determining the net effect on wage inequality.

A common feature of most of these studies, along with many others in the literature, is that they theorise the phenomenon of relative wage movements within the context of a general equilibrium framework. Although the approach has been useful in analysing the *supply-side* effects of economic reforms on resource allocation as well as income distribution, and explains how trade could accentuate the issue of widening wage-inequality via improved technology, these studies miss out on an important point. None of them incorporates the crucial role played by '*time*' on the demand side. What technology does is that it increases the production capacity of firms by raising the productivity of factors of production (displaces jobs), and hence, reduces the prices of goods and services to which it is applied (Rodrik 2018). Further, increased R&D and innovation often lead to new (and better) product varieties. While capital and technology are combined with labour inputs (more specifically, skilled labourers in the context of increased automation and information technology revolution that has happened over the past few years) to produce output – it is only labour that has the capacity to consume goods. And, this is where the role of time becomes important. An increase in income is necessary to ensure increased consumption, but it is not sufficient for a consumer must also have the time available for physical consumption/use of commodities.

Empirically, many technological innovations in the past, be it in areas like pre-cooked food, availability of new electronic gadgets, or from posts to email to instant messengers, have been time-saving (Wajcman 2015; Pant 2017). In fact, recently, this role of time has also been brought in on the production side in models of trade theory by Marjit (2007), Kikuchi (2009, 2011), and Marjit, Mandal and Nakanishi (2020), etc. Unlike the traditional models based on differences in preferences, endowments, or technology, these studies have established the role of time as the fourth catalyst behind international trade, by specifically focusing on what is referred to as 'virtual' trade and competitiveness. They show how two exactly similar countries can trade as well as gain from trade if they are located in opposite and separable time zones. In

other words, these studies have been able to establish the role of productivity of time (on the supply-side) to stimulate global trade transactions. Yet crucial questions surround the consumption possibilities created by these new production opportunities. Paul Krugman once wrote that – "*Productivity isn't everything, but, in the long run, it is almost everything*."[5] However, it is important to recognise that even higher productivity alone is not sufficient to ensure higher welfare, unless consumers find time to be able to enjoy its benefits. In fact, this is where the role of demographics of a country also becomes critical, as pointed out by Sharma (2016) and Basch (2020).

This motivates us to revisit the age-old debate on wage inequality by introducing the role of a new sector, referred to as the 'Household (H) sector', in a general equilibrium model of trade. The significance of this sector has been recently documented in a study by Marjit, Pant and Huria (2020, MPH hereafter). It plays the pivotal role of 'time' on the consumption side, unlike the studies that primarily feature it as a key supply-side factor. This is essentially the time that is required for performing household tasks, which include (but are not limited to) washing clothes and utensils, cleaning the house, along with a few outdoor activities like grocery shopping or buying other household essentials, and even child-care activity. While e-commerce platforms and the availability of innovative kitchen/cleaning gadgets have played a significant role in reducing the overall time required in performing the mundane duties, by no means they can entirely substitute for the physical labour needed to manage these domestic chores. Moreover, such activities are irksome and add to one's disutility, especially when an individual needs to juggle time between work, kids, household tasks, and everything together. This is what has incentivised the setting-up of recent start-ups like Urban Company (or Urban Clap), Zimmer, Cleancorp, etc. – the agencies that utilise their match-making algorithms to connect household service providers with their end-users. In fact, their role is not just limited to match-making, but they actually assist in generating the supply of time, which the formal sector employees otherwise spend in completing jobs that they dislike.

In this paper, therefore, we formally document the role of these (essential) service-providers by utilising a standard 2-sector (X – flexible-wage skilled-sector, and Y – a unionised unskilled-sector) general equilibrium model with wage differential, as in Carruth and Oswald (1981). The distinctive feature of our framework, however, vis-à-vis MPH (2020) is that it allows us to distinguish between the formal sector unskilled employees, who can work under these agencies

[5] Krugman (1997)

(or what we assume as comprising the H sector) if they do not find a job in the formal sector, and other household employees who, on the other hand, cannot get employment in sector Y as they do not have the requisite skill or they belong to the category of undocumented immigrants. Such an aspect was missing in MPH (2020) since it assumed perfect internal mobility of unskilled workers. As a consequence, any change in the supply of unskilled workers was not only (directly) affecting the household wage rate, but the formal production activity too, as some of the migrants could also find employment in the unskilled sector. Further, there was no difference between what a worker could earn by working in the formal unskilled sector or in the household sector. Our present framework, thus, builds on their study, and disentangles the effect of the so-called H sector, while specifically emphasising on the role of time on the consumption side. This sector now acts as a part of the third (non-unionised) sector, where the unskilled-unemployed work and earn income by enabling the formal sector employees to monetise heir time utilised in doing their household jobs.[6] What's more crucial is to note that if the latter does not find these jobs irksome, then there will be no demand for this new sector at all.[7]

This approach provides us with several interesting results on the relationship between labour movement (or, a change in 'L') and skilled-unskilled wages on the one hand, and between trade and wage-inequality on the other. In general, a standard 2-sector specific factor model ($\grave{a}\ la$ Jones 1971) shows that a higher L decreases the returns to both skilled and unskilled labour while raising the returns for the capitalists. With a unionised unskilled sector in place, the same model would show no effect on the formal wage and rental rates. However, in our case, an increase in L expands the H sector, and hence, the household wage rate falls. This unambiguously raises the net earnings of formal sector workers (both skilled and unskilled), who now pay less to get their household work done without actually affecting their gross returns as well as the overall production activity. Yet, their utility rises because they are now able to save more time by outsourcing more of their irksome duties to the household labourers. Thus,

[6] In reality, the on-demand working ecosystem not only organises the informal labour, which work as domestic help, but other skilled traders too such as educators, beauticians, electricians, and the like. However, in line with the focal point of our study (i.e., to emphasise on the role of time on the demand side), we specifically consider the demand for only irksome household activities, which working people often find hard to manage along with their busy schedules.

[7] Our work closely relates to micro models (such as Connelly 1992; Amuedo-Dorantes and Sevilla-Sanz 2014) that document the significance of the availability of unskilled immigrants in affecting the link between the parental time allocated to child-care activities and female labour force participation. Such an association has also been verified empirically in studies by Barone and Mocetti (2011), Forlani, Lodigiani, and Mendolicchio (2015), among others.

while outsourcing of production, in general, is limited by geography and technology, outsourcing of time on the consumption side crucially depends on the demographics of a country.

The results for trade liberalisation, however, are not that straightforward. Unlike the conventional wisdom, we show that an increase in the price of the (skill/human-capital-intensive) exportable may or may not lead to an increase in the household wage rate, and hence the net (formal) unskilled wage rate may not necessarily fall. However, higher trade unambiguously benefits the skilled set by raising both its gross and net earnings. Nevertheless, an interesting implication of our model, unlike other trade models, is that it allows us to show that in any country, with higher trade, net wage inequality may actually increase – an outcome that is not possible in conventional models of the H-O-S variety. This result reinforces Dani Rodrik's argument regarding the negative effect of globalisation on low-skilled workers (even in the absence of any significant change in the relative prices of labour-intensive goods), but from a different angle.[8] In our setup, we observe that even if the elasticity of demand for these workers remains unchanged, trade raises the effective supply of household labourers and hence, puts negative pressure on their wage rates (though the net effect depends on the relative changes in their demand and supply).

Thus, our work shows how some of the standard results change when the role of demand, more specifically, the importance of time, is introduced on the demand side.

In the next section, we explain our model set up, along with the results. The last section concludes the study.

2. Model and Results

X and Y represent the two formal production sectors in our small open economy, both of which require capital for their production activities. Skilled labour is specific to sector X, while goods in sector Y are produced using unionised unskilled labour (L_Y) hired at a fixed wage, $\overline{w}$. The fixed wage gets determined through negotiations with a union, and hence, puts a restriction on the number of labourers hired by this sector. Yet there exists full employment in this economy. This is because, apart from the production activities, all the formal sector workers have to perform another job that requires $0 < h_j < 1$ $(\forall j \in \{S, L_Y\})$ unit of labour for household

[8] Rodrik (1999)

maintenance, which they dislike and hence, prefer to outsource to the pool of family labour or the unemployed-unskilled individuals. The importance of outsourcing these irksome tasks can be shown from the utility function for any individual j, which is now defined as:[9]

$$U_j = U_j(C_X, C_Y, h_j) \qquad \forall\, j \in \{S, L_Y\} \qquad (1)$$

C_X, C_Y (respectively) represent the consumption of goods produced in sectors X and Y, and h_j represents domestic jobs that can be outsourced to others, such that

$$U_j'(h_j) > 0 \qquad \forall\, j \in \{S, L_Y\} \qquad (2)$$

This implies that higher utility of any individual, not only depends upon a higher level of income or consumption, but also on time not spent in doing these non-production activities. To put it differently, lower h_j entails higher costs in terms of greater disutility. Thus, we assume that all those who do not find a job in the formal sector, become a part of the *non-tradable H* sector, and work as domestic labourers in (formal) skilled and unskilled workers' households. The returns to these household workers are determined through their demand-supply equilibrium such that w_H is always less than what the formal sector employees earn, otherwise the latter will not outsource their domestic tasks to the unemployed-unskilled.[10] All other assumptions of a standard specific-factor model hold viz. production functions exhibit constant returns to scale and diminishing marginal productivities, and markets are competitive.

Our model is characterised by the following set of equations. The two production functions are:

$$X = X(K_X, S_X) \qquad (3)$$

$$Y = Y(K_Y, L_Y) \qquad (4)$$

With competitive producers maximising profits, we know that,

$$\overline{w} = Y_L(L_Y, K_Y) \qquad (5)$$

[9] Preferences are well-behaved.

[10] Although, in reality, even the household workers have to perform their domestic jobs, however, it seems reasonable to assume that given their minimal incomes, they do not have any time to spend on irksome activities/for them, no such task is irksome. Moreover, with no difference between what they earn by working in the household sector and the per-unit cost of household maintenance, they outsource all their domestic jobs to themselves. Therefore, without any loss of generality, we assume that $h_{L-L_Y} = 0$.

$$w_S = pX_S(S_X, K_X) \tag{6}$$

$$r = pX_K(S_X, K_X) = Y_K(L_Y, K_Y) \tag{7}$$

where $p(= p_X/p_Y)$ represents the world price of X in terms of Y, and w_S, r refer to the rates of return to skilled labour and capital, respectively. Unlike the formal returns, the household wage rate w_H is determined domestically based on the full employment equation for unskilled labour, i.e.,

$$L - L_Y = h_{L_Y} L_Y + h_S S_X \tag{8}$$

Here the left-hand side actually represents the surplus labour hours that can be monetised by employing them for doing irksome jobs in houses of formal sector workers, and on the right-hand side of Equation (8), we have the total demand for household labour by skilled and unskilled workers. Therefore, with $w_H < \bar{w} < w_S$, Equation (8) implicitly assumes that the rational formal sector workers outsource all their irksome activities to the pool of unemployed workers (henceforth, household labourers), and thus, becomes like a full employment equation of time (that can be outsourced to others) in our model.[11]

Now, the next question concerns the determination of the optimal value of h_j in order to compute the net earnings of the (formal) skilled and unskilled workers. From Equation (1), we can rewrite the utility function of any individual j as[12]

$$U_j = U_j\big(w_j - w_H h_j, h_j\big)$$

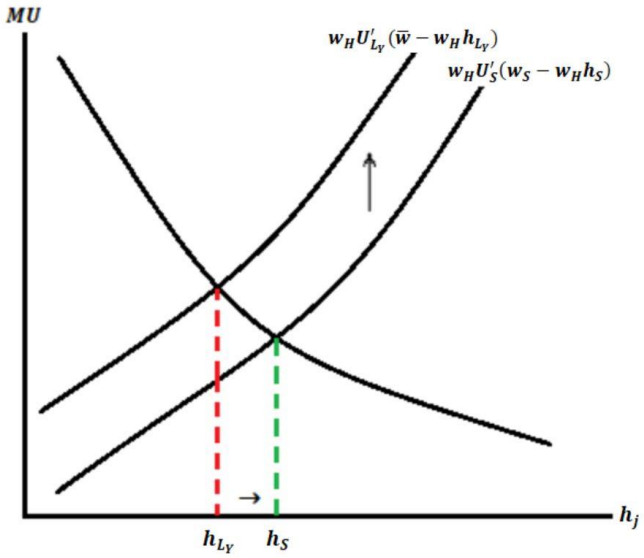
where, $(w_j - w_H h_j = pC_X + C_Y)$ represents his/her budget constraint. Thus, from the marginal first order conditions given by

$$w_H U_j'\big(w_j - w_H h_j\big) = U_j'\big(h_j\big),$$

it is clear that h_j is an outcome of utility maximising behaviour, and varies positively with the net income of any individual j.[13] This has been demonstrated in Figure 1 below.

[11] In general, the agencies (such as Urban Clap, etc.) do charge a brokerage fee for providing their services, however, we normalise that cost equal to zero for expositional simplicity.
[12] Preferences are well-behaved.
[13] This derivation has been reproduced from Appendix 1 of MPH (2020).

Figure 1: Choice of 'h_j'



Source: Adapted from MPH (2020)

Therefore, for the skilled set, with higher consumption, $U'_S(w_S - w_H h_S) < U'_{L_Y}(\bar{w} - w_H h_{L_Y})$, and, in equilibrium, $h_S > h_{L_Y}$.[14] Accordingly, we assume that

$$h_j = f(h_0, w_j - w_H), \qquad \forall\, j \in \{S, L_Y\}$$

such that

$$\widehat{h_S} = \widehat{h_0} + \lambda(\widehat{w_S} - \widehat{w_H}) = \lambda(\widehat{w_S} - \widehat{w_H}) \tag{9}$$

$$\widehat{h_{L_Y}} = \widehat{h_0} + \lambda(\widehat{\bar{w}} - \widehat{w_H}) = \lambda(-\widehat{w_H}) \qquad ; 0 \leq \lambda < 1 \tag{10}$$

Here, 'hat (^)' represents proportional change in the variables under consideration, h_0 is the (fixed) minimum time required for household maintenance, $(w_j - w_H)$ shows the difference between what an individual earns and his per-unit household maintenance cost, and $\lambda \in [0, 1)$ represents the responsiveness of his h_j to any change in this difference.[15] Thus, Equations (9)

[14] One can also associate a higher value of h_S to the fact that the richer individuals have larger assets (example, houses), and hence the irksomeness of the household work (i.e., the disutility w.r.t. to higher h_j) is more for them than their unskilled counterparts. However, this assumption is not central to our analysis. In fact, all our results hold even if the degree of irksomeness is the same for both (as assumed in Figure 1). This is primarily because the opportunity cost of not hiring anyone for household help is more for skilled workers than formal unskilled employees.

[15] Here, λ is the same for both skilled and unskilled individuals. It can be shown that this does not make much difference to the results. Since h_j represents an essential activity in our model, it seems reasonable to mention that

and (10) indicate that while any change in h_S is driven by the gap between $\widehat{w_S}$ and $\widehat{w_H}$ in the proportion λ, $\widehat{h_{L_Y}}$ varies negatively with $\widehat{w_H}$.

Thus, the net wages of the formal sector workers are given by:

$$\widetilde{\overline{w}} = \overline{w} - w_H h_{L_Y} \tag{11}$$

$$\widetilde{w}_S = w_S - w_H h_S \tag{12}$$

Full employment of skilled labour and capital implies

$$S_X = S \tag{13}$$

$$K_X + K_Y = K \tag{14}$$

We have 9 equations in the system $[(5)\text{-}(10), (13), (14)]$, with 9 unknowns – S_X, K_X, L_Y, K_Y, w_S, r, w_H, h_s, and h_{L_Y}, and seven parameters viz. p, S, K, L, $\overline{w}$, h_0, and λ.[16] Hence, the model is determinate. Using comparative statics exercises, sub-section 2.1 discusses the impact of an increase in the supply of undocumented individuals on skilled-unskilled wage rates, while the next sub-section traces through the changes in equilibrium as p is increased in our small open economy.

2.1 Labour Movement and Skilled-Unskilled Wages

Let us assume that there is an influx of undocumented unskilled labour in this small open economy either because of immigration or as a result of internal migration that usually happens due to seasonal farm jobs in any country. Thus, with $\hat{L} > 0$, we can state the following outcomes:

$$\widehat{L_Y} = 0 \tag{15}$$

which, in turn, implies that

$$\hat{r} = 0 \quad \text{and} \quad \widehat{w_S} = 0 \tag{16}$$

its demand is somewhat inelastic in nature. This is why a fall in individual $j's$ income doesn't lead to a proportionate/more than proportionate fall in his/her h_j, or vice-a-versa (i.e., $\lambda < 1$)

[16] Equation (7) actually represents two different equations, and hence, we are counting it twice.

This is because fixed return to L_Y pegs the return to capital, and therefore, K_Y and K_X do not change. As a result, there is no change in the skilled sector as well, and both $\hat{X}$ and $\widehat{w_S}$ are equal to zero. However, from Equation (8),

$$\widehat{w_H} = -\frac{L}{\lambda\left(h_{L_Y}L_Y + h_S S_X\right)}\hat{L} \tag{17}$$

With $\hat{L} > 0$, $\widehat{w_H} < 0$, and therefore, from Equations (11) and (12), we find

$$\widehat{\widetilde{w_S}} = -\frac{(1-\lambda)w_H h_S}{\widetilde{w_S}}\widehat{w_H} > 0 \tag{18}$$

$$\widehat{\widetilde{w}} = -\frac{(1-\lambda)w_H h_{L_Y}}{\widetilde{w}}\widehat{w_H} > 0 \tag{19}$$

Proposition 1. *An increase in the supply of unskilled labour necessarily raises the net earnings of both the skilled and unskilled workers employed in the formal sector, without affecting their production activity.*

Proof. From (15), (18), and (19). QED.

The intuition is that with no change in the employment of unskilled labour in sector Y, the entire burden of the increased inflow of L falls on the household sector. As a result, to restore equilibrium in the unskilled labour market, w_H falls, thus making it less costly for the formal sector workers to outsource their irksome domestic tasks to household labourers. Hence, both h_{L_Y} and h_S rise in the new equilibrium. Further, with $0 < \lambda < 1$, the proportionate rise in h_{L_Y} and h_S falls short of the proportionate fall in w_H, thereby increasing the net skilled as well as net (formal) unskilled wage rates unambiguously, as shown by Equations (18) and (19), respectively. This result differs from MPH (2020), which shows how increased unskilled immigration benefits skilled workers under some condition, while necessarily hurting their unskilled counterparts.

It is interesting to point out that with an increase in the net earnings as well as the amount of outsourced household activity, Equations (1) and (2) clearly indicate that even the utility of both types of formal sector employees increases with an increase in L. Thus, while technology enhances the productivity of time on the supply side of trade models (Marjit, Mandal and Nakanishi, 2020), incorporating the so-called H sector enables us to establish the importance of time on the consumption side, without actually affecting the production-side of our

theoretical framework. This represents a new addition to the extant theoretical literature on international trade and factor flows, and hence, the following proposition is noteworthy.

Proposition 2. *In a small open economy with a unionised unskilled sector and a household sector, an increase in the supply of unskilled labour may or may not raise the skilled-unskilled wage gap, but raises the utility of the formal sector workers. However, overall income inequality necessarily worsens.*

Proof. While there is no change in the gross earnings of both types of formal sector workers, change in net earnings enables us to compute what we refer to as *net wage-inequality* defined as the ratio of net skilled to net (formal) unskilled wage rate.

Using Equations (16) and (17), we find

$$\widehat{\widetilde{NWI}} = -(1-\lambda)w_H\left[\frac{h_S}{\widetilde{w_S}} - \frac{h_{LY}}{\tilde{\bar{w}}}\right]\widehat{w_H} \tag{20}$$

With $0 < \lambda < 1$, and assuming that $\widetilde{w_S} > \tilde{\bar{w}}$, i.e., the net skilled wage rate is more than the net unskilled wage rate (which is typically the case),

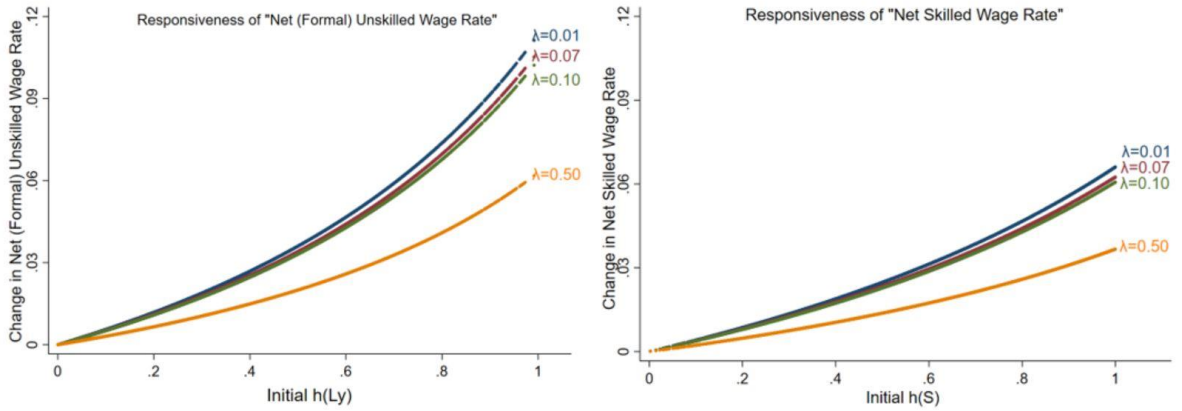
$$\widehat{\widetilde{NWI}} \gtreqless 0 \quad \text{iff} \quad \frac{h_S}{h_{L_Y}} \gtreqless \frac{\widetilde{w_S}}{\tilde{\bar{w}}} \quad \text{or} \quad \frac{\bar{w}}{h_{L_Y}} \gtreqless \frac{w_S}{h_S} \tag{21}$$

To intuitively explain this result, let's first consider the case when $(\bar{w}/h_{LY}) > (w_S/h_S)$. With $\bar{w} < w_S$, such an outcome is possible only when the gap between h_{LY} and h_S is high. Thus, if the initial value of h_{LY} is very low or h_S is very high, then the benefits of an increase in the size of household sector[17] in the form of a reduction in w_H, will be less for the unskilled than the skilled workers, as a result of which the rate of change in net wage inequality becomes positive. From the utility maximisation exercise, it is clear that the optimal value of h_j not only depends on the income differences between the two class of workers, but also on the extent of disutility associated with lower levels of outsourcing of domestic tasks, i.e., when the workers have to spend their own time in doing their household jobs, Therefore, such a possibility (when h_S is sufficiently high vis-à-vis h_{LY}) may also arise when the household work is more irksome for skilled than unskilled workers.

[17] That is, when more of household workers are available in the labour market.

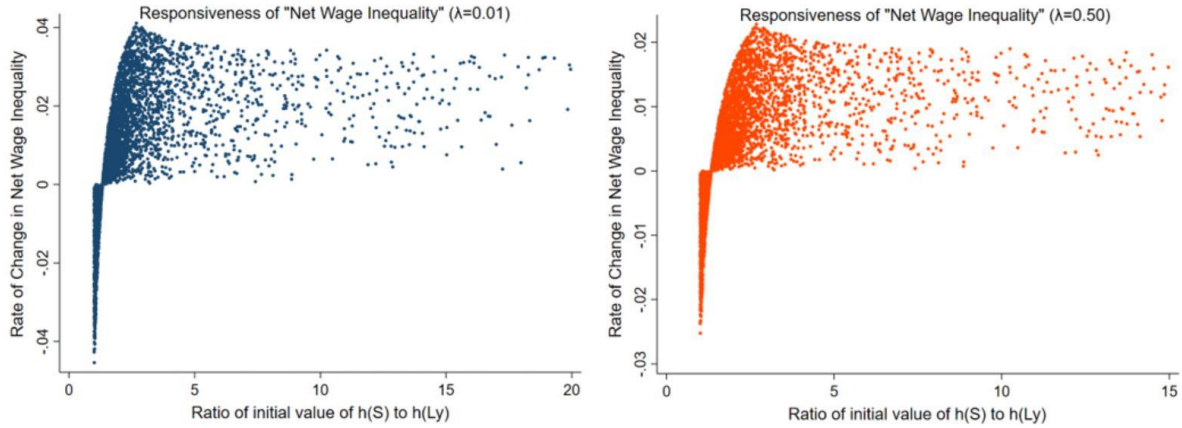
However, if h_{LY} is also sufficiently large (but less than h_S) or h_S is sufficiently small (but more than h_{LY}), then with no change in $\bar{w}$ and w_S, the net benefits to unskilled labour exceed the net rewards to the skilled, and hence, $\widehat{NWI} < 0$. In order to make the point more clearly, we also solve our model numerically, and illustrate our results in Figures 2 and 3.

Figure 2: Labour Movement and Change in Net (Formal) Wage Rates



Source: Authors' Input. *Note: In line with our model, we assume that initial* $\bar{w}$*=15,* w_S *=20,* w_H*=8,* $\widehat{w_H} = -0.10$*. The simulation results are based on a series of 4,402 random (initial) values of* h_S *and* h_{LY} *(such that* $h_S > h_{LY}$*). In the figures, we have shown the results only for a subset of the values of the ratio of initial* h_S *to* h_{LY}*.*

Figure 3: Labour Movement and Change in Net Wage Inequality



Source: Authors' Input. *Note: Here, we assume that initial* $\bar{w}$*=15,* w_S *=20,* w_H*=8,* $\widehat{w_H} = -0.10$*. The exercise is based on a series of 4,402 random (initial) values of* h_S *and* h_{LY} *(such that* $h_S > h_{LY}$*). The two panels show the results only for a subset of the values of the ratio of initial* h_S *to* h_{LY}*.*

The left and right panels of Figure 2 graph the responsiveness of the net (formal) unskilled and skilled wage rates to an increase in L on the vertical axis, against the ratio of the initial values

of h_{LY} and h_S, respectively. In Figure 3, we plot the responsiveness of the rate of change in net wage inequality against that ratio. Here, the left panel assumes that λ takes a smaller value (equal to 0.01), vis-à-vis the right panel with a relatively higher value of λ. Even though from Figure 2, it seems that the gains to the (formal) unskilled workers are always more than the gains to their skilled counterpart with a lower w_H, however, it is essential to consider that in equilibrium, $h_{LY} < h_S$. Hence, the net effect or the impact on the rate of change in net wage inequality is positive or negative depending upon the gap between the initial values of the two h_j's, as can be observed in the two panels of Figure 3.

Nonetheless, two more important points emerge from our graphical analysis. First, a higher λ is associated with a higher change in net formal wage rates but induces lesser adjustments as far as the proportionate change in net wage inequality is concerned. Secondly, the presence of $h_j$closes the wage-gap between skilled and unskilled workers (i.e., $(\widetilde{w_S} - \widetilde{\bar{w}}) < (w_S - \bar{w})$), and hence, offers a new mechanism to address the issue of intra-country wage inequality between the rich and the middle-income working classes.

To prove the second part of the proposition, let's define net income inequality (NIE) as the ratio of the total earnings of the skilled workers vis-à-vis everyone else in the economy, i.e.,

$$NIE = \frac{\widetilde{w_S} S_X}{\widetilde{\bar{w}} L_Y + w_H (L - L_Y)}$$

Totally differentiating the expression and using Equations (17)-(19), we find

$$\widehat{NIE} = -(1-\lambda) w_H h_S \left[\frac{1}{\widetilde{w_S}} + \frac{S_X}{\widetilde{\bar{w}} L_Y + w_H (L - L_Y)}\right] \widehat{w_H} > 0 \qquad (22)$$

Thus, while the net earnings of both the skilled and the unskilled rise with an increase in the size of the household sector, the fall in the payments made to the domestic workers unambiguously worsens the net income inequality in this small open economy. Note that this result is independent of whether the economy under consideration is relatively more endowed with skilled or unskilled labour. Therefore, although we have not explicitly modelled the link between the household sector and the extreme right electoral responses in many parts of the globe, our result suggests a plausible reason that might be driving such movements (Mr. Trump's immigration policy in the US, the recent BREXIT episode, or even the Arab Spring movement initiated during 2010-11).This is important to emphasise as issues of income inequality are generally ignored in general equilibrium models.

2.2 Terms of Trade and Skilled-Unskilled Wages

This sub-section examines the relationship between terms of trade and the skilled-unskilled wage rates in the presence of the H sector. With $\hat{p} > 0$ representing a rise in the price of the exportable good for the small open economy, we find

$$w_S\widehat{w_S} = -\left[\frac{X_{SK}X_K}{X_{KK}} - X_S\right]\hat{p} > 0 \tag{23}$$

and,

$$L_Y\widehat{L_Y} = -\frac{Y_{LK}X_K}{Y_{LL}X_{KK}}\hat{p} < 0 \tag{24}$$

Therefore, in gross terms, wage inequality unambiguously increases as in a standard 2-sector specific factor model, with or without unionised labour. This is because a rise in p increases the value of the marginal product of both the factors employed in sector X, thus increasing their gross returns as well. However, with unionised unskilled wages, not only this implies a shift in capital from Y to X, but also leads to a decline in the employment of unskilled labour in sector Y.

This is so far as the traditional outcomes are concerned. However, with a household sector in place, the laid-off workers also start working as domestic labourers since it is difficult for anyone to survive without wages.[18] Akin to what we observed in sub-section 2.1, this increase in the size of the household sector, thus puts downward pressure on their wage rate. But, at the same time, with an increase in w_S, there is an increase in the demand for their services by the skilled set. These effects tend to cancel out each other, and thus, in the new equilibrium, we observe that w_H may rise or fall, as shown in the following Equation (25).

$$\lambda\left(h_{L_Y}L_Y + h_S S_X\right)\widehat{w_H} = \left[\left(1 + h_{L_Y}\right)\left(-\frac{Y_{LK}X_K}{Y_{LL}X_{KK}}\right) + \frac{\lambda h_S S_X}{w_S}\left(X_S - \frac{X_{SK}X_K}{X_{KK}}\right)\right]\hat{p} \tag{25}$$

Here, the first term on the RHS represents the fall in demand for household workers due to a fall in the Y-sector workers, and the second term, on the contrary, shows a positive effect on w_H due to an increase in the skilled wage rate. This implies that (given the value of λ), the net impact on the household wage rate, and hence, the net earnings of the formal sector employees,

[18] This result could be related to the studies by Marjit, Kar and Beladi (2007), Ghosh and Paul (2011), etc. on trade and overall expansion of the informal sector.

will depend on whether the direct effect of a rise in terms of trade on skilled wage rate is stronger or weaker than the indirect effect that occurs in the presence of the *H* sector.

Proposition 3. *An increase in terms of trade, or the relative price of the goods produced in the skilled-sector, ceteris paribus, will increase the net returns to skilled workers as in a standard 2-sector specific-factor model, but may not necessarily hurt the unskilled workers. Hence, net wage inequality may or may not increase.*

Proof. Using Equations (11) and (12), we find

$$\widehat{w_S}\widehat{\widetilde{w}_S} = w_S\widehat{w_S}\left(1 - \lambda h_S\frac{w_H}{w_S}\right) - w_H h_S(1-\lambda)\widehat{w_H} \tag{26}$$

$$\widehat{\widetilde{w}}\widehat{\widehat{\widetilde{w}}} = -(1-\lambda)w_H h_{L_Y}\widehat{w_H} \tag{27}$$

Since $\left(1 - \lambda h_S\frac{w_H}{w_S}\right) > \frac{w_H}{w_S}(1-\lambda)$, and $|\widehat{w_S}| > |\widehat{w_H}|$ (from Equation (25)), we find that with an increase in gross skilled wage rate, their net earnings also expand regardless of whether w_H rises or falls.[19] However, the net unskilled wage rate falls only when the household wage rate rises. As argued by Mazzolari and Ragusa (2009), such a possibility may occur when the skilled disproportionately demand services of the informal workers, like cleaning, gardening, child-care, etc., for freeing up their time, which, in turn, raises the cost of household maintenance for everyone. Thus, even with the expansion of the *H* sector, the existing household workers gain (though the displaced formal workers necessarily lose). Such an outcome was also observed in a study by Marjit (2003), where the author specifically assumed that the informal sector provides an intermediate input to the formal (tradable) sector. Nonetheless, the relatively less-skilled or the (formal) unskilled, in our case, end up suffering with lesser net returns and lower overall utility as well.

On the contrary, if trade increases the supply of *H* workers more than it increases their demand, then w_H falls, and the (formal) unskilled workers are better off in the new equilibrium.[20]

[19] Detailed derivation is available with the authors.

[20] This could be considered as a qualification to the so-called neoclassical ambiguity in the trade literature. In a simple Ricardo-Viner framework, it refers to the ambiguity involved in assessing the impact of a change in commodity prices on the real return paid to the non-specific factor of production. However, in our case, the net returns to formal unskilled workers unambiguously rise (fall) when w_H falls (rises) with an increase in the relative price of goods produced in sector *X*.

The next concern relates to the rate of change in net wage inequality. Utilising Equations (26) and (27), we find

$$\widehat{NWI} = \frac{w_S}{\widehat{w_S}}\left(1 - \lambda h_S \frac{w_H}{w_S}\right)\widehat{w_S} - (1-\lambda)h_S \frac{w_H}{\widehat{w_S}}\widehat{w_H} + (1-\lambda)h_{L_Y}\frac{w_H}{\bar{\bar{w}}}\widehat{w_H} \qquad (28)$$

or,

$$\widehat{NWI} = \frac{w_S}{\widehat{w_S}}\left(1 - \lambda h_S \frac{w_H}{w_S}\right)\widehat{w_S} - (1-\lambda)w_H\left(\frac{h_S}{\widehat{w_S}} - \frac{h_{L_Y}}{\bar{\bar{w}}}\right)\widehat{w_H} \qquad (29)$$

From the above discussion, it is clear that whenever w_H rises, net wage inequality unambiguously increases because of a fall in net (formal) unskilled wage rate. This is evident from Equation (28) since the first two terms of the equation represent the change in the net skilled wage rate, which is always positive. But when $\widehat{w_H} < 0$, then $\widehat{NWI} > 0$ iff $\frac{\bar{w}}{h_{L_Y}} \geq \frac{w_S}{h_S}$. This condition is similar to what we observed in sub-section 2.1. It highlights the crucial role played by time on the consumption side, and how the difference in the initial values of h_S and h_{L_Y}, i.e., the amount of non-productive work that the formal sector workers are able to outsource to others (which, of course, depends on the difference in their earnings, irksomeness of domestic tasks, as well as the availability of household labour) alter some of the well-established results in the trade theory. For instance, not only our results differ from the conventional H-O-S theory, but also contrasts with the findings of relatively recent studies such as Chaudhuri and Yabuuchi (2007), in which it has been argued that a rise in the relative price of the high-skill commodity in a three-sector model (with unionised unskilled wages) unambiguously worsens the skilled–unskilled wage gap even though both skilled and unskilled wage rate decline. In fact, it is worth noting that in our case, the extent by which net wage inequality rises is less vis-à-vis those models that do not incorporate the role of the household sector, when there is no change in the earnings of the (formal) unskilled labour.

Further, an important observation is that, unlike a conventional trade model, even when we consider a fall in p, or an increase in the relative price of goods produced in sector Y (i.e., the terms of trade of the partner country), then also trade can be shown to have a positive or a negative impact on net wage inequality, depending upon the initial values of h_S and h_{L_Y}. Since these values critically depend on the availability of household labourers (apart from how much a formal sector worker earns), our findings go considerably beyond the question of whether higher trade worsens or alleviates wage inequality in any economy on which the extant trade

literature has a lot to say. Rather, it highlights why it is important to incorporate the role of time on the consumption side, which, in turn, depends crucially on the demographics of any economy.

As regards the impact on net income inequality, we find

$$\widehat{NIE} = \widehat{w_S} - \frac{1}{\tilde{\bar{w}}L_Y + w_H(L-L_Y)}[((\tilde{\bar{w}} - w_H)dL_Y) + (L_Y d\tilde{\bar{w}}) + ((L-L_Y)dw_H)] \quad (30)$$

Here, the first term in the square bracket on the RHS represents the change in income for the displaced workers, which is always negative since $dL_Y < 0$, and net wage rate of (formal) unskilled workers cannot be less than that of household workers. The second term represents the change in net income of the (formal) unskilled workers, which varies negatively with the change in the household wage rate, while the last term represents the change in earnings of the household labourers. Thus, from our discussion above, it is clear that the net impact on income inequality remains ambiguous, depending upon whether the direct effect of a change in w_H is stronger than the indirect effect that affects the formal workers (skilled as well as unskilled) via the change in their net income. This contrasts with the case of unskilled immigration or a rise in the overall size of the household sector, where NIE unambiguously rises with a fall in the household wage rate, without affecting the gross earnings of the formal sector workers.

3. Concluding Remarks

Since the 1980s or so, the link between globalisation and the skilled-unskilled wage gap has been a long-standing issue in international economics. While the earlier research focussed on the debate between trade and skill-biased technical progress, followed by theories on product fragmentation and the increased outsourcing of domestic jobs by the global North, more recently, the literature has developed further to incorporate the role of 'time' on the supply side of trade models. In the context of the information technology revolution, these studies cover an important aspect of trade, specifically 'virtual trade', and establish the significance of productivity per unit of time, in contrast to productivity per unit of labour as has been often done in classical and neo-classical models of trade.

However, what has largely been overlooked in all these supply-side theories, is the crucial role played by time on the consumption side. In other words, these models often fail to recognise that even consumption is subject to a binding constraint imposed by the availability of time, more so in countries where the population is not growing. In fact, this is the reason as to why

EMEs with favourable demographics are now becoming the most attractive destinations for the majority of the world's big manufacturing players (Tanchua and Shand 2016; Mancini et al. 2017; Jamrisko, Nag and Teso 2019; among others). Thus, in this paper, we attempt to address this issue by proposing a simple extension of the standard informal sector model with wage differential by incorporating the importance of time on the consumption side.

Akin to the growing literature on outsourcing of production tasks, and its effect on wage-inequality, our model documents the significance of consumption time by assessing the impact of outsourcing of domestic jobs to household labourers, and demonstrating how some of the traditional results cease to hold in the presence of the household sector. Particularly, in the context of the debate on international factor flows and wages or an overall expansion of the informal sector, we show how an increase in the supply of a specific factor not only benefit that specific factor but the other specific factor as well without actually affecting their production activities. This outcome is not possible in conventional models of the H-O-S variety. We also show how the effect of trade on skilled and unskilled wages crucially depends on the extent to which the formal sector workers are able to free up their labour hours by outsourcing their non-production activities to the household labourers. Another important observation relates to the issue of income inequality, which is mostly overlooked in general equilibrium models of trade. Our framework, however, shows how (net) income inequality unambiguously rises with an expansion of the household sector, while it may or may not necessarily worsen with trade.

Therefore, while the trade theorists have already documented *time* as the fourth determinant of trade (apart from technology, endowment, and preference), our findings suggest that it is equally imperative to capture how consumption possibilities (and, hence the role of time on the consumption side) become the fifth catalyst for determining patterns of production and stimulating global trade transactions.

Acknowledgement

We are very grateful to Prof. Sugata Marjit for his valuable comments and suggestions.

References

Acharyya, Rajat, and Sugata Marjit. 2000. "Globalisation and inequality: An analytical perspective." *Economic and Political Weekly*: 3503-3510. <http://www.jstor.org/stable/4409777>

Amuedo-Dorantes, Catalina, and Almudena Sevilla. 2014. "Low-Skilled Immigration and Parenting Investments of College-Educated Mothers in the United States Evidence from Time-Use Data." *Journal of Human Resources* 49, no. 3: 509-539. doi: 10.3368/jhr.49.3.509

Barone, Guglielmo, and Sauro Mocetti. 2011. "With a little help from abroad: the effect of low-skilled immigration on the female labour supply." *Labour Economics* 18, no. 5: 664-675. <https://doi.org/10.1016/j.labeco.2011.01.010>

Barua, Alokesh, and Manoj Pant. 2014. "Trade and wage inequality: A specific factor model with intermediate goods." *International Review of Economics & Finance* 33: 172-185. < https://doi.org/10.1016/j.iref.2014.04.004>

Basch, Mark. 2020. "End of global population boom 'a major drag on economic growth'." *Jacksonville Daily Record*, January 28, 2020. Retrieved from <https://www.jaxdailyrecord.com/article/end-of-global-population-boom-a-major-drag-on-economic-growth>

Beladi, Hamid, and Ravi Batra. 2004. "Traded and nontraded goods and real wages." *Review of Development Economics* 8, no. 1: 1-14. <https://doi.org/10.1111/j.1467-9361.2004.00216.x>

Bhagwati, Jagdish N., and Vivek Dehejia. 1993. "Freer trade and wages of the unskilled: is Marx striking again?." Discussion Paper 672, Columbia University Libraries. <https://doi.org/10.7916/D8BZ6DJ6>

Carruth, Alan A., and Andrew J. Oswald. 1981. "The determination of union and non-union wage rates." *European Economic Review* 16, no. 2: 285-302. < https://doi.org/10.1016/0014-2921(81)90005-2>

Chaudhuri, Sarbajit, and Shigemi Yabuuchi. 2007. "Economic liberalization and wage inequality in the presence of labour market imperfection." *International Review of Economics & Finance* 16, no. 4: 592-603. < https://doi.org/10.1016/j.iref.2005.12.004>

Chowdhury, Sahana Roy. 2010. "Technology and outsourcing: An explanation to the rising wage gap." *Economic Modelling* 27, no. 1: 380-387. < https://doi.org/10.1016/j.econmod.2009.10.002>

Connelly, Rachel. 1992. "The effect of child care costs on married women's labor force participation." *The review of Economics and Statistics*: 83-90. doi:10.2307/2109545

Feenstra, Robert C., and Gordon H. Hanson. 1995. *Foreign investment, outsourcing and relative wages*. No. w5121. National Bureau of Economic Research. DOI: 10.3386/w5121

Forlani, Emanuele, Elisabetta Lodigiani, and Concetta Mendolicchio. 2015. "Impact of low-skilled immigration on female labour supply." *The Scandinavian Journal of Economics* 117, no. 2: 452-492. < https://doi.org/10.1111/sjoe.12101>

Ghose, Ajit K. 2000. *Trade liberalization and manufacturing employment*. (Employment Paper 2000/3). ILO. <92-2-112066-X[ISBN]>

Ghosh, Amit, and Saumik Paul. 2008. "Opening the Pandora's box? Trade openness and informal sector growth." *Applied Economics* 40, no. 15: 1995-2007. < https://doi.org/10.1080/00036840600915273>

Gopinath, Munisamy, and Weiyan Chen. 2003. "Foreign direct investment and wages: a cross-country analysis." *Journal of International Trade & Economic Development* 12, no. 3: 285-309. doi: 10.1080/0963819032000132067

Gupta, Manash Ranjan, and Priya Brata Dutta. 2010. "Skilled–unskilled wage inequality, nontraded good and endogenous supply of skilled labour: a theoretical analysis." *Economic Modelling* 27, no. 5: 923-934. < https://doi.org/10.1016/j.econmod.2010.05.013>

Huria, Sugandha, and Manoj Pant. 2018. "Foreign direct investment, welfare and wage inequality in a small open economy: theory and empirics." *Indian Economic Review* 53, no. 1-2: 131-166. < https://doi.org/10.1007/s41775-018-0025-z>

Jamrisko, Michelle, Anirban Nag, and Yumi Teso. 2019. "Emerging-market investors pin their hopes on strong consumers." *Economic Times*, September 13, 2019. Retrieved from <https://economictimes.indiatimes.com/markets/stocks/news/emerging-market-investors-pin-their-hopes-on-strong-consumers/articleshow/71106822.cms?from=mdr>

Jones, Ronald W. 1971. "A three factor model in theory, trade, and history." In *Trade, balance of payments and growth: Papers in honor of Charles P. Kindleberger*, edited by J. Bhagwati, R. W. Jones, R. A. Mundell, & J. Vanek, 3-21. Amsterdam. <https ://doi.org/10.1016/j.econmod.2010.06.006>

Katz, Lawrence F., and Kevin M. Murphy. 1992 "Changes in relative wages, 1963–1987: supply and demand factors." *The quarterly journal of economics* 107, no. 1: 35-78. < https://doi.org/10.2307/2118323>

Kikuchi, Toru. 2009. "Time zones as a source of comparative advantage." *Review of International Economics* 17, no. 5: 961-968. < https://doi.org/10.1111/j.1467-9396.2009.00811.x>

Kikuchi, Toru. 2011. *Time zones, communications networks, and international trade*. Routledge Studies in the Modern World Economy, Routledge Sciences.

Krugman, Paul R. 1997. *The age of diminished expectations: US economic policy in the 1990s*. MIT press.

Leung, Hing-Man. 1998. "On wage-inequalities in the North and in the South." *Journal of International Trade & Economic Development* 7, no. 3: 299-315. < http://dx.doi.org/10.1080/09638199800000016>

Lu, Hsin Chang. 2000. "International competition and wage differentials-the case of Taiwan." *Journal of International Trade & Economic Development* 9, no. 1: 101-114. < https://doi.org/10.1080/096381900362571>

Mancini, Matteo, Wiktor Namysl, Rafael Pardo, and Sree Ramaswamy. 2017. "Global growth, local roots: The shift toward emerging markets." McKinsey & Company. Retrieved from < https://www.mckinsey.com/business-functions/operations/our-insights/global-growth-local-roots-the-shift-toward-emerging-markets>

Marjit, Sugata, and Rajat Acharyya. 2003. *International trade, wage inequality and the developing economy: A general equilibrium approach; with 15 tables*. Springer Science & Business Media.

Marjit, Sugata, Biswajit Mandal, and Noritsugu Nakanishi. 2020. *Virtual Trade and Comparative Advantage: The Fourth Dimension*. Springer. <https://doi.org/10.1007/978-981-15-3906-0>

Marjit, Sugata, Manoj Pant, and Sugandha Huria. 2020. "Unskilled immigration, technical progress, and wages—Role of the household sector." *Review of International Economics* 28, no. 1: 235-251. < https://doi.org/10.1111/roie.12448>

Marjit, Sugata, Saibal Kar, and Hamid Beladi. 2007. "Trade reform and informal wages." *Review of Development Economics* 11, no. 2: 313-320. < https://doi.org/10.1111/j.1467-9361.2007.00409.x>

Marjit, Sugata. 2003. "Economic reform and informal wage—a general equilibrium analysis." *Journal of Development Economics* 72, no. 1: 371-378. <https://doi.org/10.1016/S0304-3878(03)00082-8>

Marjit, Sugata. 2007. "Trade theory and the role of time zones." *International Review of Economics & Finance* 16, no. 2: 153-160. < https://doi.org/10.1016/j.iref.2005.08.002>

Mazzolari, Francesca, and Giuseppe Ragusa. "Spillovers from high-skill consumption to low-skill labor markets." *Review of Economics and Statistics* 95, no. 1 (2013): 74-86. < https://doi.org/10.1162/REST_a_00234>

Mollick, André Varella. 2008. "Relative wages, labor supplies and trade in Mexican manufacturing: Evidence from two samples." *Journal of International Trade and Economic Development* 17, no. 2: 213-241. < https://doi.org/10.1080/09638190701872673>

Pant, Manoj. 2017. "Global recession: Why it shows no signs of petering out." *Financial Express*, July 17, 2017. Retrieved from <https://www.financialexpress.com/opinion/global-recession-why-it-shows-no-signs-of-petering-out/765916/>

Qureshi, Zia. 2018. "Trends in income inequality: global, inter-country, and within countries." *nd*. Retrieved from <https://www.brookings. edu/wpcontent/uploads/2017/12/global-inequality. pdf.

Rodrik, Dani. 1999. " Globalisation and labour, or: if globalisation is a bowl of cherries, why are there so many glum faces around the table?" *Market Integration, Regionalism and the Global Economy*: 117.

Rodrik, Dani. 2018. "Will new technology in developing countries be a help or a hindrance." In *Geneva, Switzerland: World Economic Forum*, October 9, 2018. Retrieved from <https://www. weforum. org/agenda/2018/10/willnew-technologies-help-or-harm-developing-countries/>

Salomons, Anna. 2018. *Is automation labor-displacing? Productivity growth, employment, and the labor share*. No. w24871. National Bureau of Economic Research. doi: 10.1353/eca.2018.0000

Sharma, Ruchir. 2016. "The demographics of stagnation: Why people matter for economic growth." *Foreign Aff.* 95: 18, March/April 2016. Retrieved from <https://www.foreignaffairs.com/articles/world/2016-02-15/demographics-stagnation>

Tanchua, Jennelyn. and Diane Shand. 2016. "Emerging Markets May Offer the Most Potential for the World's Largest Consumer-Focused Companies." *S&P Global*, August 3, 2016. Retrieved from <https://www.spglobal.com/en/research-insights/articles/emerging-markets-may-offer-the-most-potential-for-the-worlds-largest-consumer-focused-companies>

Tran, Duong Lam Anh. 2020. "Effect of international trade on wage inequality with endogenous technology choice." *The Journal of International Trade & Economic Development*: 1-26. < https://doi.org/10.1080/09638199.2020.1813795>

Unel, Bulent. 2010. "Firm heterogeneity, trade, and wage inequality." *Journal of Economic Dynamics and Control* 34, no. 8: 1369-1379. <https://doi.org/10.1016/j.jedc.2010.03.005>

United Nations Conference on Trade and Development (UNCTAD). 2014. *Tackling inequality through trade and development in the post-2015 development agenda* (TD/B/61/7). Trade and

Development Board: Geneva. < https://unctad.org/meetings/en/SessionalDocuments/tdb61d7_en.pdf>

United Nations Department of Economic and Social Affairs (UN DESA). 2020. "World Social Report 2020: Inequality in a Rapidly Changing World." United Nations: Geneva. *https://www. un. org/development/desa/dspd/wpcontent/uploads/sites/22/2020/01/World-Social-Report-2020-FullReport. pdf* (2020).

Van Reenen, John. 2011. "Wage inequality, technology and trade: 21st century evidence." *Labour economics* 18, no. 6: 730-741. < https://doi.org/10.1016/j.labeco.2011.05.006>

Wajcman, Judy. 2015. "How time-saving technology has completely backfired." *Quartz* (New York and London), October 17, 2015. Retrieved from <https://qz.com/533291/how-time-saving-technology-has-completely-backfired/>

Yabuuchi, Shigemi, and Sarbajit Chaudhuri. 2007. "International migration of labour and skilled–unskilled wage inequality in a developing economy." *Economic Modelling* 24, no. 1: 128-137. < https://doi.org/10.1016/j.econmod.2006.06.006>

Yeaple, Stephen Ross. 2005. "A simple model of firm heterogeneity, international trade, and wages." *Journal of international Economics* 65, no. 1: 1-20. < https://doi.org/10.1016/j.jinteco.2004.01.001>

Zeira, Joseph. 2007. "Wage inequality, technology, and trade." *Journal of Economic Theory* 137, no. 1: 79-103.

Zhu, Susan Chun, and Daniel Trefler. 2005. "Trade and inequality in developing countries: a general equilibrium analysis." *Journal of international Economics* 65, no. 1: 21-48.