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Market Outcomes in East Asia:
Why Did the NIEs Forge so far Ahead?

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MANUFACTURING GROWTH, TRADE AND LABOUR MARKET OUTCOMES IN EAST ASIA: WHY DID THE NIEs FORGE SO FAR AHEAD?

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Abstract

This paper seeks to explain different real wage outcomes in two groups of East Asian economies: two New Industrialising Economies (NIEs: Korea and Taiwan), and three Southeast Asian economies (ASEAN-3: Malaysia, Thailand and Indonesia), all of which grew rapidly for several decades prior to the Asian economic crisis. Drawing on international and national data sets, the paper examines dynamic interactions between manufacturing growth and labour market outcomes. It adopts the dualistic Lewis model, which highlights the role of ‘unlimited’ supplies of labour in economic development and the transition towards the turning point, as a heuristic device to inform the empirical analysis. A simple regression model is employed to examine the determinants of real wages over the first two decades of accelerated growth in the two groups of economies. This finds that while both demand and supply factors contributed to real wage growth, the supply variable which proxied surplus labour conditions was especially significant in the NIEs compared with the ASEAN-3. The model did not find any evidence for institutional factors having a significant impact on the different wage outcomes between the NIEs and the ASEAN-3.

Keywords: Wages, Employment, Manufacturing Growth, Exports, East Asia

JEL Categories: F160, J200, O140

MANUFACTURING GROWTH, TRADE AND LABOUR MARKET OUTCOMES IN EAST ASIA: WHY DID THE NIEs FORGE SO FAR AHEAD?¹

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I. INTRODUCTION

Prior spectacular modernisation of China and later India in recent times, the story of rapid economic growth in a handful of East Asian economies was dubbed a ‘miracle’ by some observers. The remarkable experience of the “High Performing Asian Economies” (HPAEs) of East Asia was unprecedented in the development experience up to the 1990s (World Bank, 1993; Balassa, 1998). These countries share much in common in terms of growth rates and patterns compared with other parts of the developing world. However, they differed in several other respects, such as the stock of human capital and governance arrangements in support of public policy, during the early decades of sustained growth (Booth, 1999). One less well known contrast was more rapid real wage growth that underpinned a labour market transition and earlier industrial upgrading among the Northeast Asian economies and Singapore (NIEs), compared with several of the major Southeast Asian countries. This area of research is a neglected area of the East Asian development experience. Analysis of these trends has broader implications for helping us understand one aspect of labour market dynamics and potential industrial transformation in other parts of the developing world, including in the rapidly growing Chinese and Indian economies.

¹ Earlier versions of this paper were presented at a seminar at the Global Development Network Conference in Brisbane, January 31-February 1, 2008, at the Division of Economics, Research School of Pacific and Asian Studies, ANU on May 27, 2008, and at the East Asian Economics Association Convention in Manila, November 15-16, 2008. The authors would like to thank participants at both meetings for comments and especially Professor Prema-chandra Athukorala for valuable inputs into the structure and content of the paper. The normal disclaimers apply.

This paper takes a fresh look at factors contributing to this earlier and sustained labour market transition in the NIEs compared with several of the ASEAN countries. One obvious explanation for the difference between the two groups of countries is simply earlier and more rapid economic growth over the 30 year leading up to the Asian economic crisis in 1997-1998. However, while of relevance, this explanation is not entirely satisfactory. Although growing at slower rates than the NIEs, the main Southeast Asian economies (with the exception of Philippines) performed credibly by developing country standards over roughly the same time period.

Another explanation is the **pattern** of growth behind more rapid and sustained wage growth in the NIEs. For example, on the demand side of the labour market, the greater focus on promoting the export of labour-intensive manufacturing could be expected to play a significant role in contributing to shortages of unskilled labour and faster wage growth. A final factor given less attention is the interaction between the increased demand for unskilled labour and characteristics of the supply side of the labour market for unskilled labour. It is well known that manufacturing in most East Asian countries drew on a quite elastic supply of labour from low productivity agriculture in the early stages of development (Booth and Sundrum, 1985; Galenson, 1992; Fields 1994). Less is known of the possible role that supplies of 'surplus' labour from agriculture had on distinct patterns of wage growth, and hence subsequent industrial transition.

Thus we examine both demand and supply determinants of real wage outcomes. Put simply, we contend that the shift of labour into these activities was greater and the

'surplus' to be transferred was smaller in the NIEs. As a result, real unskilled wages rose earlier and more sharply in the NIEs compared with the ASEAN countries. This provided a platform for later rapid industrial up-grading in the NIEs, when other factors came into play, especially the better educated population (Booth, 1999).

We also test whether more flexible labour markets may have played some role in hastening this labour market transition in the NIEs, although we suspect that different labour market policies are probably only a complementary factor in helping explain the divergent path in wages compared with the ASEAN countries. They may have helped ensure that labour moved more quickly from the low productivity sectors into the rapidly growing export-oriented sectors in the NIEs.

In the paper, we compare the growth experience and interaction with labour market trends in the NIEs in their first 20 years of rapid growth (1965-1985) with selected ASEAN countries over a similar, but later time period (1975-1995). We first present some data on the main variables, to set the stage for the later discussion. The next section seeks to place these developments within a broader analytical framework dealing with the interaction between economic growth and labour markets in the early stages of economic development. In this discussion, we take the Lewis model of the 'labour surplus' economy as a point of departure. We then report on the results of several simple regression exercises which seek to explain different rates of growth in manufacturing wages in general in East Asia, among the two groups of countries and in light of different labour supply and labour policy variables. A final concluding section discusses some policy implications and qualifications.

II. ECONOMIC GROWTH AND CONTRASTING LABOUR MARKET OUTCOMES

As alluded to above, seven middle income East Asian countries, together with Japan, were identified by the World Bank as the High Performing Asian Economies in the early 1990s (World Bank, 1993). Their fame stemmed from what some authors have claimed was the East Asian economic ‘miracle’ in the second half of the 20th century. Nevertheless, the World Bank, which coined the term the HPAEs, claimed the achievement was far from a miracle. In contrast to the rest of the developing world, the leading international development agency argued that this group of countries had followed a similar export-oriented and market-friendly path of economic development which, associated with prudent macroeconomic policies and heavy investments in human capital, had underpinned structural change and poverty decline.

Aside from Japan that modernised much earlier, the miracle economies identified by the World Bank composed two distinct groups: the ‘NIEs’ (Singapore, Hong Kong, South Korea and Taiwan) that industrialized from the 1960s, and the ‘ASEAN-3’ (Indonesia, Thailand and Malaysia) that followed a decade or so later. In this paper, we focus on contrasts between these two groups of countries: two of the NIEs (Korea and Taiwan)² and the ASEAN-3 economies respectively. The latter three are all Southeast Asian countries, and include the three fastest growing countries in this region, besides Singapore, from around 1970 through to the Asian Financial Crisis in 1998. For each group of countries we examine economic performance during the first two decades of sustained economic growth (1965-1985 in the NIEs and 1975-1995 in the ASEAN-3).³

Before turning to the econometric analysis, we take a quick look at the trends in the key variables highlighted in this paper. First, what are the trends in our key dependent variable, unskilled wages. Figure 1 shows how the two NIEs have outperformed

² Hong Kong and Singapore, the two NIE without a sizable agricultural sector, were excluded from the analysis largely because of problems of data availability.

³ We discuss the selection of countries and dates in more detail in the methodological section below.

ASEAN-3s by experiencing higher growth in real unskilled wage rates.⁴ The figure shows that Korea and Taiwan performed better than every other nation in terms of average annual real unskilled wage growth. In both Korea and Taiwan, real wage growth in unskilled manufacturing industries accelerated around the middle of the period as labour markets for unskilled labour tightened, after a 10-15 years of rapid economic growth.⁵

Among the ASEAN-3 countries, Malaysia experienced relatively high average growth rates, although they were slower than in Korea and Taiwan. In Thailand and Indonesia unskilled wages grew relatively slowly, despite substantial increases in employment in unskilled industries.⁶

Second, we examine trends in the demand side variables studied in this paper: labour intensive manufacturing output, productivity and exports. Table 1 indicates that the NIEs and ASEAN-3s behaved similarly in terms of output and productivity during the first two decades of sustained growth. However, the table highlights that the NIEs outperformed ASEAN-3 nations in terms of export expansion. Note particularly that the NIEs exhibited higher export ratios during both decades, always maintaining a margin of about twenty percentage points. Nevertheless, it is also worth indicating that ASEAN-3 nations experienced a more rapid increment in exports during this period than the NIEs, this is partly because the latter started from a relatively high export base. The table supports the notion that export orientation played an important role in the development strategy of both subregions (Balassa, 1998).

Table 1: Trends in demand side variables: Exports, output, and productivity, twenty years of sustained growth (manufacturing)

⁴ Real wages per worker are calculated using wage and employment data from UNIDO (2006). Taiwan data comes from the Taiwan Statistical Yearbook. Real wages are presented in 1980 USD. The conversion to real wages in 1980 USD is performed using CPI and exchange rate data from the IMF's International Financial Statistics (see Section III of the paper for further discussion of the variables examined in the econometric analysis)..

⁵ Kuo, Ranis and Fei (1981: 12-26) discuss these patterns in the case of Taiwan; Bai (1985) examines the 'turning point' in Korea (around the mid 1970s) when labour markets tightened significantly.

⁶ Unskilled wages show a sharp, somewhat implausible increase at the end of the period in Indonesia.

	<i>NIEs</i>		<i>ASEAN-3</i>	
	YR1-10	YR11-20	YR1-10	YR11-20
Exports share (%)	32	47	12	30
Output (millions)	2610	10205	3226	12180
Productivity (thousands)	11	18	11	16

Notes: All data is calculated for the labour intensive manufacturing sector. Exports are calculated as a share of gross manufacturing output. Output and productivity are presented in 1980 USD. Productivity is measured as output per worker due to data availability.

Source: UNIDO (2006) and UN Comtrade.

Contrasts in employment experience were more marked than that of wages. Employment in unskilled industries close to tripled in each of the NIEs over the first ten years of accelerated growth, whereas they grew more slowly in the ASEAN-3 countries, particularly in Malaysia (Figure 2). In this latter group of countries, employment in unskilled industries only began to accelerate in the second decade of rapid growth, indicating a later focus on exports in industries like textiles, footwear and simple electronic assembly activities than in the NIEs. It is therefore no surprise that pressure for unskilled wage increases shown in Figure 1 only began to build up towards the end of the period of accelerated growth in the ASEAN-3. These strains dissipated, subsequently, with the onset of the East Asian financial crisis that hit this group of countries hardest.

These patterns of growth in wages and employment in labour-intensive industries are taken as a starting point for the analysis of factors contributing to differences in wage trends in the two groups of economies. However, we also need to introduce labour supply characteristics into the story. To do this we draw on the Lewis labour surplus model which is based on the notion that labour supply to the modern sector is relatively elastic in the early stage of development. The next section discusses how these conditions of labour might help explain divergence in real unskilled wages between the NIEs and the ASEAN-3 discussed above.

III. ELASTIC LABOUR SUPPLY: A HYBRID LEWIS MODEL

As noted, we motivate the story with reference to the well known Lewis development model. The Lewis model explains the growth of a developing country in terms of the transition of labour between two sectors or groups of sectors – the ‘traditional’ (low productivity) and ‘modern’ (high productivity) sectors (Lewis, 1954).⁷ The fundamental process of economic development identified by Lewis traces the transfer of low productivity and low wage labour from traditional sectors to the modern sectors where productivity and wages are much higher. The transfer of surplus labour occurs at constant real wage rates over time into more productive jobs in the modern sectors in the early stages of development. In the Lewis model the ‘turning point’ is reached when real wages begin to rise and there is convergence in real wage rates between the modern and traditional sectors. This transfer of relatively cheap labour generates profits for capital accumulation and industrialization.⁸

In our hybrid Lewis model, however, there is no need for a presumption that the supply of unskilled labour is perfectly elastic to the modern sector (implying zero marginal product in traditional activities). The only requirement is that the supply curve is elastic, and can be transferred into the moderns sector at low marginal cost. Our main focus is on the relationship between the supply of labour in the traditional sector and growth in wages in the modern sector. Traditional sector labour supply is proxied by the share of employment in agriculture in and modern sector wages by average wages in labour-intensive manufacturing sectors.

The basic process of adjustment in the labour market is shown in Figure 3. As demand for labour expands in the modern sector, supply contracts in the traditional sector (see the upper and lower panels in the Figure). Initially, the

⁷ The two sectors are frequently proxied by the agricultural and industrial sectors as representing the traditional and modern sectors respectively. In fact, Lewis was interested in the flow of labour between modern manufacturing and all low productivity sectors which included agriculture, some services, cottage industries and the informal sector.

⁸ While theoretically real returns to labour per hour do not increase during the labour surplus stage of development, real incomes of the former traditional sector workers may increase significantly, since labour is deployed more efficiently and intensively in the modern sector

transfer of labour out of the traditional sector and into the growing modern sector takes place with small changes in the wages in both sectors. Later, as the supply of low productivity labour is exhausted, the supply curve of labour to the modern sector becomes increasingly inelastic and real wages rise more rapidly in order to attract new workers into the modern sector.

The outcome in terms of labour markets depends partly on the speed with which economies move towards the turning point. This in turn depends on both the rate of growth of the modern sector as well as the relative size of the traditional sector. At one extreme, where the traditional sector is small, or the wage and productivity gap with the modern sector is not large, or declines quickly, rapid growth in modern sector might be sufficient to absorb most low productivity labour and contribute to rising wage rates and structural change early on in the development process. We expect this situation to more closely parallel labour market developments among the NIEs.

At the other extreme, if growth is slower in the modern sector, or the supply of low productivity labour is large relative to the size of the modern sector, surplus labour is shed at a much slower pace into the modern sector, and the productivity gap between the two sectors remains distinct for longer periods.⁹ This situation is expected to more closely reflect labour market conditions in the ASEAN countries.

In the former case, especially relevant to agricultural development in the NIEs, the traditional sector is transformed quite early in the development process. To cope with labour scarcity, employers utilise more capital and skilled manpower contributing to a narrowing gap in productivity with the modern sector. We have seen that this appears to have been the response of both Korea and Taiwan where agriculture diversified and modernised in the 1960s and 1970s. Employment fell

⁹ For example, in the early stages of development traditional sectors typically absorb around 60-70 percent (or more) of total employment compared with less than 10 percent in the rapidly growing modern sectors (bearing in mind that government and service sectors absorb a significant share of non-traditional employment).

and labour productivity rose sharply, paralleling growth in productivity outside the agriculture sector (Booth and Sundrum, 1985: 50). As shown in figure 4, the agricultural share of total employment had fallen from around half to around 20 percent in both countries over the 20 year period to the mid 1980s.¹⁰

Where movement towards the turning point is slower, traditional sectors can remain major employers of labour for some time. This pattern is suggested by trends in agricultural employment in Thailand and Indonesia. In these two countries, labour productivity grew less quickly in agriculture compared with the NIEs, and technological change and growth in area cultivated were labour-absorbing in the early stages of accelerated growth (see Booth and Sundrum, 1985: 50).¹¹ Agricultural employment share was still around 50 percent of total employment at the end of the twenty year period, around double the share in the two NIEs and Malaysia (see Figure 4)

If the transition is rapid, shortages of unskilled labour in the modern sector also contribute to industrial upgrading, and the entrepreneurs engage in more capital-intensive and skill-intensive activities. To the extent that the economy had been engaged in export of relatively labour-intensive products, based on a comparative advantage in the deployment of unskilled labour during the labour surplus phase, as in the NIEs, a successful adjustment after the turning point is marked by a shift to more capital and skill intensive exports.¹²

The subsequent discussion focuses on the relative role of both demand and supply side factors in helping explain different rates of wage growth in the two groups of countries.

¹⁰ A similar pattern is apparent in Malaysia which in this respect appears to have responded more like the NIEs than the other ASEAN countries.

¹¹ Data presented in Annex 1 suggest that agricultural productivity in Indonesia was never above 30 percent of total labour productivity in all other sectors, and in Thailand never above 15 percent of total labour productivity in all other sectors over the period 1975-1995.

¹² Although not a major theme of this paper, an important part of the story with respect to the contrasting adjustment process among the NIEs and the ASEAN-3s, relates to the greater preparedness of the NIEs to respond to shortages of unskilled labour after the turning point. Owing to a greater abundance of human capital, they were better placed to move into more skill and capital intensive manufacturing output and exports (Booth, 1999).

We then look briefly at institutional factors which might help explain the significant divergence in real wage growth among the NIEs and ASEAN-3.

IV. DETERMINANTS OF WAGE GROWTH IN LABOUR-INTENSIVE MANUFACTURING

We now turn to an econometric analysis of the determinants of real wages in labour-intensive manufacturing in the two groups of countries. The main hypothesis is that not only demand side but also supply side variables related to the supply of unskilled manpower available to the modern sector have been important in influencing wage outcomes. On the demand side, we concentrate on output, labour productivity and exports in labour-intensive industries, which were identified in World Bank (1993) and other authors as one of the main drivers of growth during this initial period.¹³ Labour intensive manufacturing exports are computed as a share of total manufacturing gross output. Productivity in labour intensive manufacturing is proxied as the ratio of output to employment in these industries.¹⁴ On the supply side, the share of unskilled labour employed in agriculture is adopted as a proxy variable for supply side pressures on the wages in the 'modern' labour-intensive manufacturing sector. The dependent variable is average wages in labour-intensive industries over the twenty year period in each country.

Selection of Countries and Dates

There are limitations in any attempt to categorise and generalize about countries in groups, especially in a study covering a small number of countries. We excluded both Singapore and Hong Kong from the group of NIE economies on data availability grounds, especially with regard to a clearly defined, traditional sector of employment.¹⁵

¹³ See especially Kuo, Ranis and Fei (1981) and Krueger (1983: Chapter 2).

¹⁴ Labour intensive industries are defined as according to ISIC codes identified in Ariff and Hill (1985) and labour intensive, manufactured exports are classified according to the methodology in Lall (2000), which relies on grouping goods according to SITC (revision 2).

¹⁵ Neither country had an agricultural sector of any significance in terms of total employment which is comparable to the agricultural sector in the other countries included in the study. However, we did include Singapore in the initial regressions and can report that the results of the regression analysis were not significantly affected by the exclusion of this country.

Malaysia has special characteristics which marks it apart from its ASEAN counterparts. Malaysia has historically been a more open economy than all of its neighbours save Singapore, it encouraged labour exports earlier and started with a much higher level of per capita income in the 1970s than the other ASEAN-3 countries, and indeed than Korea and Taiwan among the NIE economies in the 1960s (see Athukorala, 1998). Yet its growth performance and labour market outcomes display much more in common with its less developed ASEAN neighbours.

The same time period (20 years) is arbitrarily chosen for each group of countries partly for ease of exposition. However, the starting point differs for each group. For the NIEs group we have taken 1965 as the starting point. Figure 5 provides a justification of our choice of years. The figure indicates that the onset of the almost exponential increase in the growth rate of real GDP per capita in the NIEs occurred in the mid to late 1960s. We therefore, define the first twenty years of sustained economic growth of the NIEs to be from 1965 to 1985. Figure 5 also indicates that the ASEAN-3s experienced their period of high sustained growth at around the mid-1970s. We therefore define the first twenty years of sustained economic growth in ASEAN-3 nations to be 1975 to 1995. Figures A-1 and A-2 in Appendix A indicate that this choice of years is roughly consistent with the onset of sustained economic growth in the individual nations that compose these two sub-regions.

With regard to individual countries, both Korea and Taiwan introduced reforms in the early 1960s which took them along the path to export oriented growth in manufacturing (Song, 1990; Kuo, Ranis and Fei, 1981). Among the ASEAN-3s, the Indonesian economy had recovered from the disastrous decline in living standards in the early to mid 1960s, and by 1975 had just experienced the oil price shock of 1973 which provided a major stimulus for growth for the second half of the 1970s (Booth and McCawley, 1981). Malaysia had successfully negotiated race riots in 1969, introduced the New Economic Policy which gave certain preferences to Malays in the labour market and in business and begun to attract foreign capital into special economic zones set up by the early 1970s

(Malaysia. Bureau of National Economic Policy Studies, 1994).¹⁶ In the case of Thailand, per capita growth accelerated from the mid 1970s through to 1979, slowing in the early 1980s and then experiencing what has been described as the economic “boom period” from 1987 to 1996 (when the economy grew at an average of 9 percent per annum) (Warr, 2003).

With regard to end points, the data clearly show that economic growth slowed, and the role of manufacturing in growth changed as the modern service sectors became more prominent, in the NIEs in mid 1980s when the Plaza accord was signed, realigning Japanese, Korean and Taiwanese exchange rates (World Bank, 1986). In the case of the ASEAN-3, the long period of accelerated growth came to a sudden halt in 1997-1998 with the Asian financial and later economic crisis.¹⁷

This selection of dates is somewhat arbitrary, and dictated by the availability of data, especially for the NIEs. We chose different dates for the starting point in each group of countries because economic reform and accelerated growth took place earlier in the NIEs than in the ASEAN-3. There are potentially some problems with this approach, especially related to different international circumstances affecting growth in the 1960s and 1970s, and how these might in turn have influenced domestic responses. However, our focus is on domestic patterns of growth and adjustment, and policies, in the early decades of accelerated development rather than on international circumstances that defined them.

¹⁶ Like Singapore a decade earlier, Malaysia experienced nine years of sustained economic growth from 1976 through to 1985, and then expanded at an average of 8-9 percent through to the eve of the Asian economic crisis, after two years of poor growth.

¹⁷ The year 1995 seems to be an appropriate ending point for the ASEAN-3. Although growth was still rapid in 1996 in Malaysia and Indonesia, the Thai economy began to falter seriously in 1996 when export growth fell from a sustained annual growth rate of around 15-20 percent to register a negative figure, the first for almost 15 years (Warr, 2003: 6).

Data Sources

Employment, wage, and output data on labour-intensive industries are taken from UNIDO (2006). Agricultural employment data are derived statistical yearbooks in the early years in the case of Korea and Taiwan, from data collected in National Labour Force Surveys, and from the Asian Development Bank annual publication of *Key Indicators of Developing Asian and Pacific Countries* from 1977 onwards. Trade data for all nations, excluding Taiwan, comes from UN Comtrade. Taiwan trade data comes from the Taiwan Statistical Database (1994), and other data on Taiwan from the annual *Taiwan Statistical Data Book*. See Appendix B for details.

Real unskilled manufacturing output and wages are measured in 1980 US Dollars. These data were deflated using CPI figures from the International Financial Statistics (IMF) database. Labour intensive, manufactured exports are classified according to the methodology in Lall (2000), which relies on grouping goods according to SITC (revision 2). Wages, employment and output in unskilled industries is calculated following an adaption of the classification employed in Ariff and Hill (1985), which relies on ISIC (revision 2). Annex Table 2 gives the descriptive statistics of the main variables employed in this paper.

a. The Basic Model

The empirical model in this study involves estimating an equation which provides for capturing the impact of both labour supply and labour demand factors on wages in the two groups of countries. The aim is to examine why the ASEAN-3 nations lagged behind their NIE counterparts in terms of this important labour market outcome. Formally, this can be analysed using the following equation:

$$W_{it} = \beta_1 A_{i,t-1} + \beta_2 Z_{i,t-1} + \alpha_i + D_2 + \varepsilon_{it} \quad (1)$$

where W_{it} refer to labour intensive employment and real wages of country i at time t , $A_{i,t-1}$ is a measure of labour supply conditions proxied by the share of agricultural employment in total employment in the previous period; $Z_{i,t-1}$ is a vector of labour demand variables in the previous period; α_i is a country fixed effect, D_2 is a second decade dummy variable, and ε_{it} is a normally-distributed mean-zero error term.

Note that to ensure that our results capture the effect of the independent variables on wages (rather than the reverse), we regress the current year's dependent variables on the past independent variables. In testing our results we lagged the dependent variables by up to five years. The results remained largely unchanged and we therefore do not present these estimates here.

Our preliminary regression analysis showed the presence of an AR(2) process at one percent level of significance in terms of the Arellano-Bond and Wooldridge tests. Although autocorrelation of this nature does not affect coefficient estimates, it does affect standard errors and t-statistics. One therefore is likely to conclude that variables are insignificant when they should be significant. As a result we compute Newey-West standard errors which provide for t-statistics that are robust to autocorrelation and heteroscedasticity.¹⁸

The results from estimating Equation (1) are provided in Table 2. On the demand side, the table shows a positive and significant relationship between real labour intensive wages and both output and productivity. Productivity is of particular interest as this variable is expected to capture some of the supply side variation in the data because it is likely to be determined by the capacity of workers to adapt to and efficiently work in the modern sector. Our results, thus, suggest that a worker's capacity to adapt to the modern sector is an important determinant of wage growth. We do not have data on the educational composition of low wage workers between the two groups of countries. But given significantly higher levels of secondary schooling enrolments in the NIEs compared with the ASEAN countries at early stages of development (Booth, 1999), we might expect productivity effects to be stronger in the former group of countries (see below).

The results described above are robust to specifications with and without country fixed effects, which confirms the strength of the relationship. Our preferred specification is

¹⁸ This is performed in a straight forward manner in STATA by using the `newey2` command setting the lag order to 2.

with fixed effects, as we hope to control for omitted variables that vary through time but are constant within countries, such as geographical location. For this reason, the fixed effects model is preferred in all subsequent specifications. The fixed effects regressions indicate that an increase in labour intensive output or productivity by 10 percent will result in an increase in real labour intensive manufacturing wages by approximately 5 and 8 percent, respectively.¹⁹

Interestingly, labour intensive exports over gross output are found to have a negative and significant effect on real labour intensive wages in our fixed effects specification. This has to do with the high level of collinearity between exports and the remaining variables.²⁰ Annex Table 3 shows strong correlation between exports and the remaining variables. It is not surprising for output and productivity to be highly correlated with exports in these nations since the push for export-oriented industrialisation has been identified as a key factor driving growth in these nations (Balassa, 1998). However, we did not expect a priori for labour surplus and exports to be strongly negatively correlated (the correlation coefficient is -0.78). A possible explanation for this strong correlation may be due to our construction of this variable. Labour surplus is proxied as the share of workers employed in agriculture. Hence, as the export-oriented sector expands, this agricultural share contracts as workers move towards higher earning sectors of the economy. We deduce that the negative correlation between exports and labour surplus is stronger than with other demand variables simply because export expansion is driving growth in manufacturing output and productivity.²¹

Note that we decide to simply live with this colinearity problem as there are only two possible ways of redressing this problem. One is to collect more data, which is not possible in this study. The other is to drop some insignificant variables. However, doing so may generate omitted-variable biases in the estimated coefficients. We therefore run

¹⁹ Note that similar results are obtained under the other specifications adopted in our analysis shown in Tables 2 and 3 below.

²⁰ The very high reported R-squared gives impetus to this interpretation.

²¹ We re-estimated a “bivariate” fixed effects model with exports as the only explanatory variables and found the expected positive and significant relationship. We do not report these results as they may suffer from omitted variable bias and thus have little explanatory power.

Equation (1) with and without exports and conclude that omitted variable bias is unlikely and that our results seem robust to various specifications.

We turn now to the discussion of the supply side. Table 2 shows a negative relationship between real labour intensive wages and labour surplus proxied by the share of agricultural employment, under various specifications as well as with and without country fixed effects. Our results suggest that as the share of surplus workers declines, real wages in labour intensive industries rise, even in the presence of high demand for labour. That is, after controlling for output, productivity and exports.

All columns in Table 2 show that a decline in labour surplus measured by a fall in the ratio of agricultural employment to total employment by 10 percent will result in a rise in unskilled real wages by approximately 20 to 40 percent, *ceteris paribus*. The fixed effects regression estimates suggest that a decrease in labour surplus by 10 percent is associated with a increase in real labour intensive wages by approximately 35 percent on average. In all instances the estimated coefficient is significant at a 1 percent level.

Table 2 shows that the affect of labour surplus dominates that from the demand side variables in terms of both level of significance and coefficient estimates. Figure 6 summarises the results with respect to labour surplus. The figure shows a strong negative relationship between labour surplus and labour-intensive real wages in East Asia. Clearly, if labour intensive manufacturing industries face a large pool of unskilled workers, then it is difficult for workers to bid up wages even in the face of strong growth in demand for labour (see Figure 3 above).

These results provide strong support for the Lewis notion of surplus labour acting as a constraint to real wage expansion. The success of the NIEs and the ASEAN countries in penetrating world markets through the export of labour-intensive products is well known, as the first phase in their remarkable development experience. However, although employment effects were substantial (see Figure 2 above) in the early stages of development, significant growth in real wages was dependent on mopping up surplus

labour. This suggests one key possible explanation for the different outcomes in the NIEs versus the ASEAN-3: while export-oriented manufacturing took off in both sets of countries, the exhaustion of labour surplus occurred earlier and contributed to a shift to the next phase of industrial upgrading in the NIEs, whereas this transition was delayed in the ASEAN-3.

Table 2: Labour Intensive Real Wages Regressions, with and without Fixed Effects

Dep var: L-int real wages	(1)	(2)	(3)	(4)	(5)	(6)
Ag empl share	-3.54*** (-4.03)	-3.84*** (-5.28)	-2.07*** (-4.98)	-3.91*** (-7.74)	-1.79*** (-5.68)	-3.14*** (-4.77)
L-int man output	0.38** (3.00)	0.47*** (6.25)				
L-int man productivity			0.81*** (15.21)	0.77*** (11.27)	0.80*** (15.10)	0.76*** (10.20)
L-int man exports	-0.95 (-1.38)	-1.96** (-3.12)	-0.36 (-1.27)	-1.06** (-3.16)		
D2	-0.09 (-0.54)	-0.11 (-1.44)	-0.03 (-0.55)	-0.06 (-1.03)	-0.05 (-0.91)	-0.13* (-2.34)
Country fixed effects?	No	Yes	No	Yes	No	Yes
Observations	100	100	100	100	100	100
R-squared	0.66	0.91	0.91	0.95	0.91	0.94

Notes: Robust Newey-West t-statistics in parentheses, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Independent variables are lagged by one year with respect to the dependent variable. All variables are presented in log form.

b. Model 2: The Role of Labour Surplus in Explaining Wages in Each Sub-Region

The basic model demonstrated the importance of the role of labour surplus in explaining wage outcomes. Since this is an area that has been neglected in the literature, it has received more attention in this study. In particular, it is pertinent to ask whether the relationship discussed above can be observed in both sub-regions. This is an important question because it is possible that labour surplus may create greater downward pressure on wages in one sub-region than in the other. To answer this question we introduce interactive dummy variables into the regression analysis. This is performed by

interacting a sub-regional binary dummy variable with the ratio of agricultural to total employment. Formally, the estimated equation thus becomes:

$$W_{it} = \beta_1 A_{i,t-1} + \beta_2 A_{i,t-1} * S_region + \beta_3 Z_{i,t-1} + \alpha_i + D_2 + \varepsilon_{it} , \quad (2)$$

where the variable *S_region* is a binary dummy variable that is one if a particular country is within the sub-region being tested. This is standard practice when trying to investigate inherent differences in behaviour between countries in the same sample. By introducing this interactive dummy variable we can interpret the results as follows: the estimated effect of an increase in the ratio of agricultural to total employment in the sub-region in question is given by $\beta_1 + \beta_2$. If β_2 is found to be insignificant, we can deduce that there are no marked differences between the sub-region and the rest of the sample.

We undertook two separate exercises (see Table 3). In the first instance, we interacted an NIE dummy variable with the labour surplus proxy. Our results, in this instance, confirmed a negative and significant relationship between labour surplus and real wages. Columns 1 to 3 in Table 3 indicate that the relationship between labour surplus and real labour intensive wages in the NIEs is always found to be negative and significant. The coefficient estimate for the effect of labour surplus on wages in the NIEs is approximately -4.

The second exercise, gave us a different result, which we present in Columns 4 to 6 in Table 3. Interestingly, the estimated coefficient for the ASEAN-3 interactive dummy was found to be positive and significant. Column 4, for instance, indicates that an increase in labour surplus by 10 percent, as captured by a rise the ratio of agricultural to total employment, will result in a decrease in labour intensive real wages by 26.4 (-44 + 1.76) percent in ASEAN-3 nations. This is substantially less than the expected decrease for the NIEs.

Figure 7 summarises these points by plotting the estimated fitted lines for the NIEs and ASEAN-3s, respectively. While the relationship between labour surplus and manufacturing wages was still negative, it was much less so than that for the NIEs.

It is instructive to note also that there is little difference between the two groups of countries in terms of the relationship between the demand side variables and real wages. Output and productivity were positive and significant in both cases. Thus the possible effects of higher levels of education in the NIEs on productivity mentioned above does not seem to have had a significant effect on differences in real wage outcomes between the two groups of countries.

These results suggest that surplus labour was less significant for wage outcomes in the ASEAN-3 than in the NIEs. One possible interpretation is that ASEAN-3 nations exhibited greater difficulties in labour mobility compared with the NIEs— that is, workers were unable to swiftly and easily move from the agricultural to the industrial sectors of the economy. Alternatively, labour markets were highly integrated in the NIEs across modern (manufacturing) and traditional (agricultural) sectors. Geographical factors that may generate these difficulties are accounted for in the fixed effects regressions.²² However, policy factors may also play a role. It is possible that countries such as Indonesia and Thailand experienced greater levels of labour market rigidities related to policy stance that impede transition from one sector to another than the NIEs. Fields (1994), for example, has drawn attention to the flexible labour markets in the NIEs, while other authors have argued that the region as a whole has tended to have a relatively low level of direct government or organised labour intervention in wage setting or employment.²³ However, it is possible that the less significant finding for the labour surplus variable for the ASEAN-3 might be explained by greater government regulation of labour markets, compared with the NIEs. We examine this possibility below.

²² Geographical factors might include more dispersed patterns of human settlement, and less intensive rural urban ties in the ASEAN-3 compared with the geographically more compact NIEs, which are endowed with smaller land areas. This would raise transaction costs of moving across labour markets.

²³ Similarly, Edwards and Lustig (1997) argue that East Asian economic success was due, in large part, to a significant degree of labour market flexibility, which allowed small and medium-sized firms to adapt rapidly to new market conditions, remain competitive internationally, and take advantage of technological advances. Additionally, Manning (1998) finds that labour market flexibility has served East Asian countries not only in adapting to the high growth period but to the recession that followed the Asian crisis of the late 1990s.

Table 3: Wage equations with Sub-Regional Interactive Dummy Variables

Dep var: L-int real wages	(1)	(2)	(3)	(4)	(5)	(6)
Ag empl share	-1.02	-2.65***	-1.68**	-4.75***	-4.40***	-4.07***
	(-1.04)	(-3.86)	(-2.79)	(-5.65)	(-7.81)	(-5.28)
Ag empl share in NIEs	-3.73**	-1.76*	-2.39**			
	(-3.26)	(-2.26)	(-3.10)			
Ag empl share in ASEAN3				3.73**	1.76*	2.39**
				(3.26)	(2.26)	(3.10)
L-int man output	0.42***			0.42***		
	(5.97)			(5.97)		
L-int man productivity		0.71***	0.68***		0.71***	0.68***
		(9.32)	(8.95)		(9.32)	(8.95)
L-int man exports	-1.30*	-0.80*		-1.30*	-0.80*	
	(-2.07)	(-2.23)		(-2.07)	(-2.23)	
D2	-0.05	-0.03	-0.07	-0.05	-0.03	-0.07
	(-0.76)	(-0.56)	(-1.24)	(-0.76)	(-0.56)	(-1.24)
Country fixed effects?	Yes	Yes	Yes	Yes	Yes	Yes
Observations	100	100	100	100	100	100
R-squared	0.93	0.95	0.95	0.93	0.95	0.95

Notes: Robust t-statistics in parentheses, *** p<0.001, ** p<0.01, * p<0.05. Independent variables are lagged by five or ten year with respect to the dependent variable. All variables are presented in log form.

c. Labour Market Rigidities

So far, our analysis suggests that labour surplus is associated with very strong negative movements in real wages in the NIEs and weaker, though still significant, movements in the same direction in ASEAN-3 countries. Here we test whether this stems from differences in labour market rigidities in these nations. In particular, we ask whether it is possible that labour markets are relatively more flexible in the NIEs than in ASEAN-3 nations. If this is the case, then it is possible that labour market flexibility can explain why the NIEs observed better labour market outcomes than the ASEAN-3 countries.

In order to test this hypothesis we re-run Equation (2) with an additional explanatory variable: the labour market rigidities index (Li1). Li1 is also interacted with the ASEAN

dummy (Li1 ASEAN-3) to examine the impact of this variable in the ASEAN-3 countries by themselves

Labour market rigidities are measured using an index constructed by Forteza and Rama (2006). This index is a composite measure of data commonly used by different observers to analyse major rigidities in labour markets. It encompasses minimum wages (the most commonly observed distortion of labour market equilibrium); mandated benefits (which include all age pensions, health insurance, maternity leave, mandated job security and high firing costs); trade union membership; and the share of government employment in the total labour force (these workers are subject to more stringent regulation than the rest of the economy). The index is normalised such that its absolute maximum value takes the value of one and its minimum that of zero. The data come from Rama and Artecona (2002). Due to the unbalanced nature of the Rama and Artecona dataset, we opt to use this variable, but interpret the results with caution.²⁴

Table 4 presents estimates for Equation (2) (concentrating on the ASEAN-3s) with the additional explanatory variable. Altogether, the inclusion of the labour market rigidities index into the models makes little difference to the estimates. Thus we are able to confidently conclude the stronger effect of labour surplus on wage outcomes in the NIEs than in ASEAN-3 nations does not seem be due to labour market rigidities. In fact, this measure of rigidities was consistently found to have no significant effect on labour intensive real wages.²⁵

²⁴ It is important to note that there are (at least) two limitations of using a composite labour market rigidity index of this nature. First, one cannot say with certainty which component of the index is relevant for wage outcomes in a given country. Second, different components will dominate the labour market effect in individual countries.

²⁵ Political liberalisation led to a different role played by governments and unions in setting wages in several of the NIEs and in Indonesia; but this occurred for the most part after the 20 year period of rapid growth in both groups of countries. Both Korean and Taiwanese governments extended labour regulations to protect industrial workers only towards the very end (or after) of the 20 year period examined here. Labour regulations were rarely implemented under Soeharto during the early period of rapid growth in Indonesia (Manning, 1998); new legislation and freer trade unions changed the picture after 1998.

Table 4: Wage equations controlling for labour market rigidities

Dependent variable: real wages	(1)	(2)	(3)	(4)
Ag empl share	-5.40*** (-7.51)	-4.83*** (-7.05)	-5.30*** (-7.01)	-4.74*** (-7.56)
Ag empl share in ASEAN3	3.13*** (3.44)	2.05* (2.13)	2.65* (2.62)	1.72 (1.84)
Li1	0.59 (1.49)	0.26 (0.65)	0.15 (0.28)	-0.10 (-0.21)
Li1*ASEAN-3			0.82 (1.28)	0.71 (1.22)
L-int man output	0.13* (2.02)		0.11 (1.71)	
L-int man productivity		0.34** (2.87)		0.30** (2.65)
L-int man exports	-0.29 (-0.71)	-0.22 (-0.74)	-0.34 (-0.82)	-0.30 (-0.91)
D2	-0.03 (-0.47)	-0.05 (-0.61)	-0.04 (-0.52)	-0.05 (-0.68)
Country fixed effects?	Yes	Yes	Yes	Yes
Observations	85	85	85	85
R-squared	0.92	0.92	0.92	0.93

Notes: Robust t-statistics in parentheses, *** p<0.001, ** p<0.01, * p<0.05. Independent variables are lagged by 5-10 years with respect to the dependent variable. All variables are in log form.

V. CONCLUSIONS

In this paper we posed a puzzle: why did real wages rise so quickly in the New Industrialising Economies (NIEs) compared with a second group of rapidly expanding East Asian economies in Southeast Asia (the ASEAN-3), during their respective early periods of rapid economic growth. One simple explanation is that the NIE economies grew faster than the three ASEAN economies examined in the paper. But real wages in unskilled industries, in particular, rose very rapidly in the NIEs, in economies which started at relatively low levels of per capita income and productivity. In the case of Korea, for example, Amsden (1989: 195, 199) notes that “unrivalled” wage behaviour in the history of earlier industrial revolutions need to be explained through reference to a variety of factors: rapid capital accumulation, the low base level of wages when industrialization took off in earnest, the structure of Korean agriculture, long working weeks and labour market segmentation.

We have suggested a similar, though slightly different explanation for the NIEs as a group. This concentrates on the development strategy that took advantage of abundant unskilled labour, and single-mindedly promoted labour-intensive manufacturing output. The ASEAN-3 countries also promoted labour-intensive manufacturing as a development strategy, but they did so later in the development process, and their efforts were cut short by the Asian economic crisis, just over 20 years later.

In line with our hypothesis, the regression suggests that both demand factors associated with output and productivity in labour-intensive manufacturing, and supply factors associated with the supply of unskilled labour significantly affected real wage growth. The results suggest that supply side factors were more significant in the NIEs than in the ASEAN-3. At the same time, the larger and more backward agricultural sector played some role in slowing wage growth and subsequent structural change in the ASEAN-3, and especially in Thailand and Indonesia.

Unlike in Malaysia, Thailand and Indonesia, the NIEs did not have the luxury of abundant agricultural land as an option for absorbing surplus labour during the early stage of rapid economic growth. Thus, in pursuing a policy that sought to maximize growth and deploy relatively abundant unskilled labour into higher productivity occupations, the NIEs adopted policies that created opportunities outside agriculture, where opportunities for productivity growth were greater. We found that the rapid decline in the share of the labour force in agriculture played a greater role in determining the outcome in terms of wages in labour-intensive industries, than the demand variables included in the analysis (output, labour productivity and share of labour-intensive exports in total manufacturing). As suggested by other authors, we also found that labour market policies did not play a major role in determining different rates of growth of real wages during this early period of accelerated economic growth. This is in contrast to the different experience of the NIEs compared with China where living standards of low productivity labour from the countryside has been held back by institutional arrangements that have prevented integration of rural-urban migrants into the urban labour market in the case of China (Li and Luo, 2008).

The finding of rapidly rising wages much earlier in the NIEs goes beyond the direct impact on living standards and poverty. It makes a small contribution to reconciling debates about whether the growth of the NIEs was largely market oriented, as contended by the World Bank (1993), rather than through state-led, interventionist policies which promoted industrial growth directly (Amsden 1989; Wade, 1990). In the early stage of development, comparative advantage based on low wages was the main mechanism through which the NIEs achieved rapid economic and export growth, supported by a major government push to promote labour-intensive exports. Later, it might be argued that industrial restructuring was induced by rapidly rising wages, and gave an impetus for more interventionist government policies to promote industrial growth domestically and abroad.

The broader significance of this paper lies in its pinpointing a key difference in the development strategies among several of the 'miracle' East Asian countries. It helps

explain why one group are now among the developed industrial and service based economies of the world and the other still struggling as middle income countries. The NIEs, of course, progressed quickly beyond the labour-intensive stage of development, supported by heavy investment in schooling and skills development. The ASEAN-3 countries, particularly Thailand and Indonesia, are still in the process of absorbing a high proportion of low productivity workers engaged in the agriculture and the informal sector.

A number of qualifications to the findings should be noted. First, the first twenty years of rapid growth for each group of countries have been selected somewhat arbitrarily. Within each group of countries, the timing of programs of economic reform and accelerated growth differed, and not all countries started this process in 1965 for the NIEs or 1975 for the ASEAN-3. Second, the selection of countries was also somewhat arbitrary. Some were excluded because of data problems, and we have lumped together countries with different characteristics into two groups; Malaysia, in particular, displayed several features which were closer to the NIEs than the other ASEAN countries. Third, owing to problems of data availability, our measure of labour surplus - the relative share of the work force in agriculture - is a crude one. Not all workers in agriculture engaged in low productivity jobs, even at early stages of development, and low productivity workers were also likely to be heavily concentrated in the 'informal sector' in the early stages of development (Pang and Manning, 1990).²⁶ In the case of Malaysia and Thailand, cheap migrant workers (many of them unregistered) were under-enumerated in agriculture and other low wage sectors towards the end of the 20 year period (Athukorala and Manning, 1999). This probably contributed to the weaker results which we obtained for the labour supply variable in the regression equations for the ASEAN-3 countries.

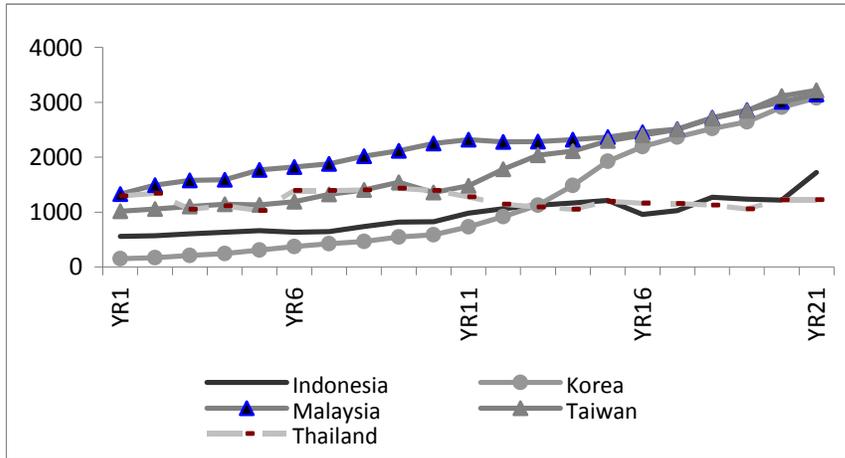
²⁶ For example, although significantly less than parity, agricultural labour in Malaysia recorded higher productivity relative to other sectors than in other countries, throughout the period examined (see Annex Table 1).

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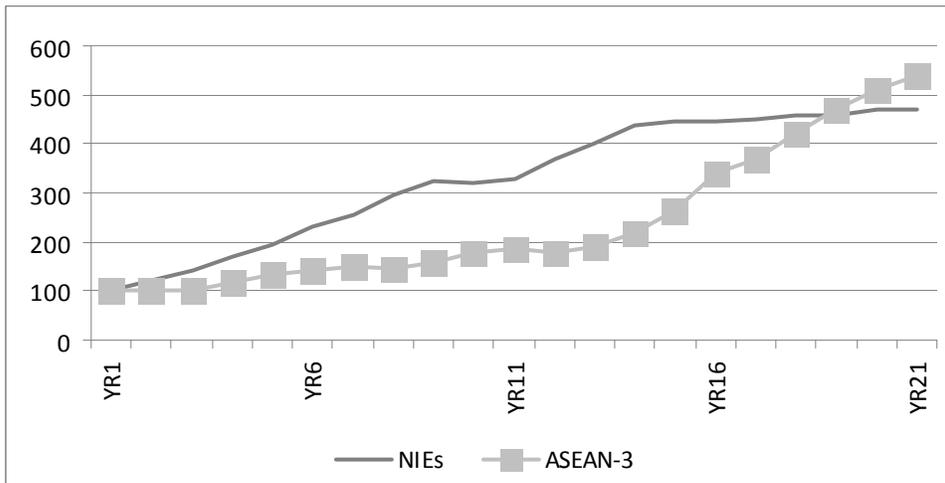
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Figure 1: Real Unskilled Wages in Selected East Asian countries, Twenty Years of Sustained Growth (1980 USD)



Source: Calculations based on data from UNIDO (2006), Taiwan Statistical Yearbook, and International Financial Statistics, IMF.

Figure 2: Growth Rates of Employment in Labour Intensive Manufacturing during the first 20 years of Rapid Growth, NIES v ASEAN-3



Source: Calculations based on UNIDO (2006) and data on employment in unskilled manufacturing industries cited in Galenson (1979: p.390).

Figure 3: Wage and Employment Dynamics in the Lewis Model of a Surplus Labour Economy

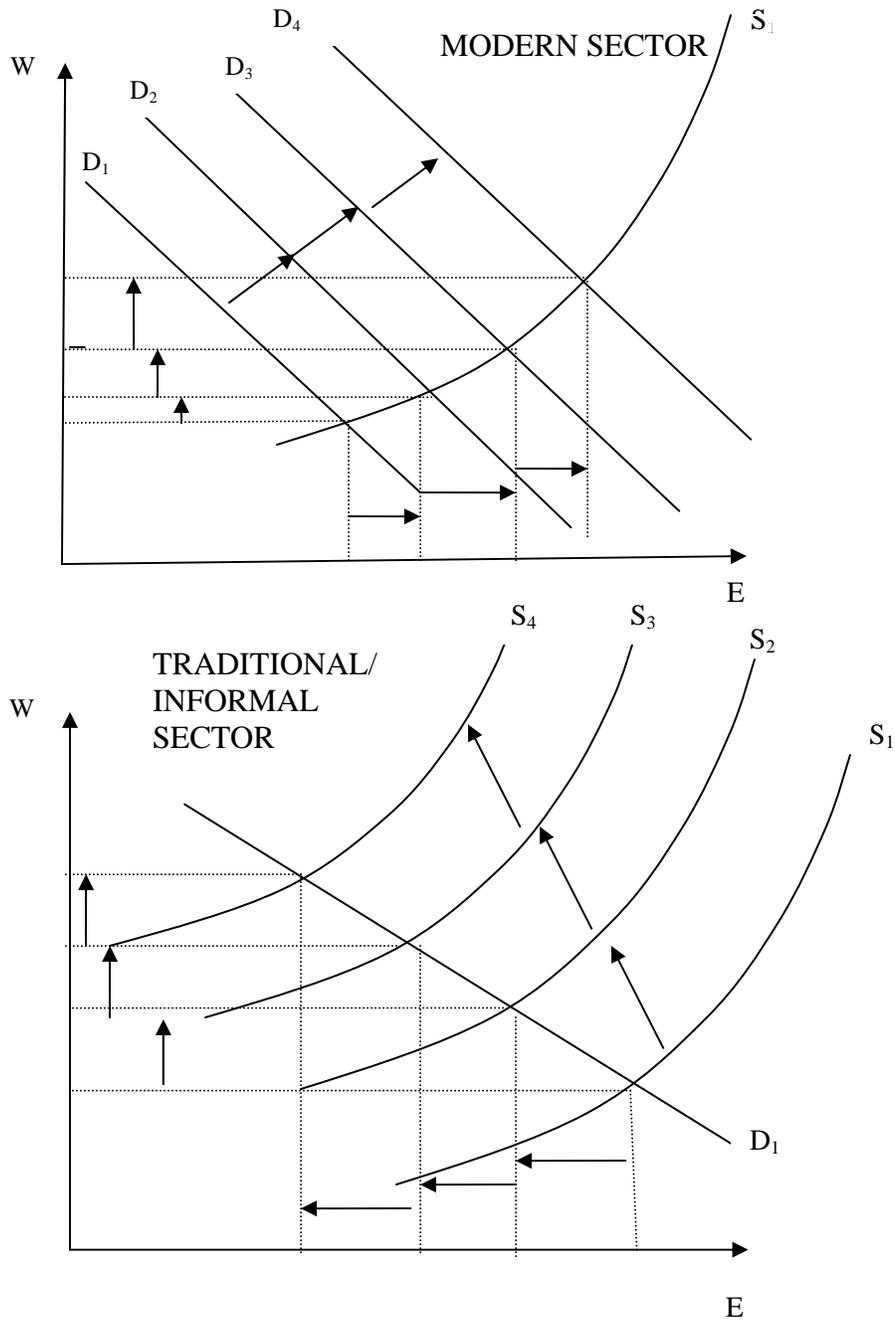
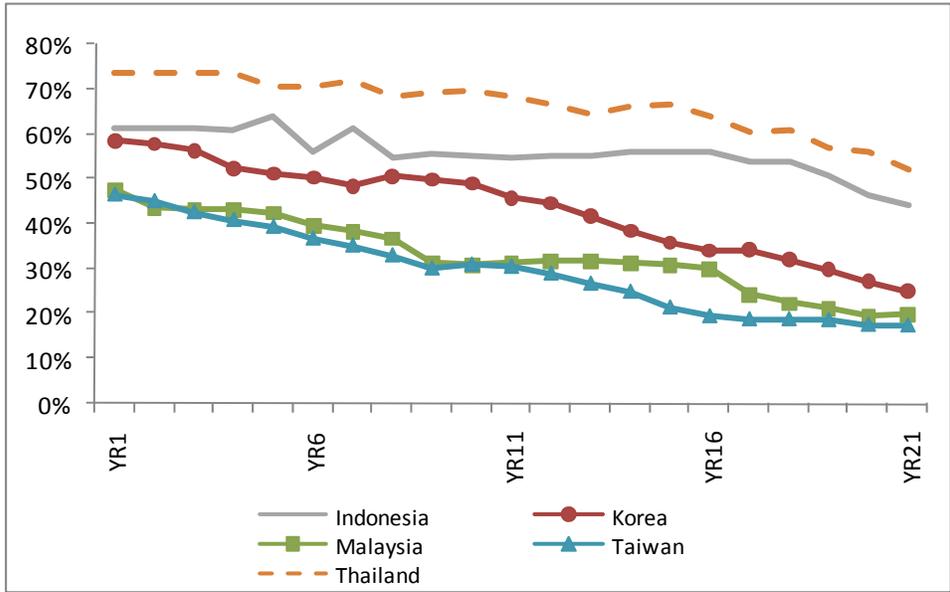
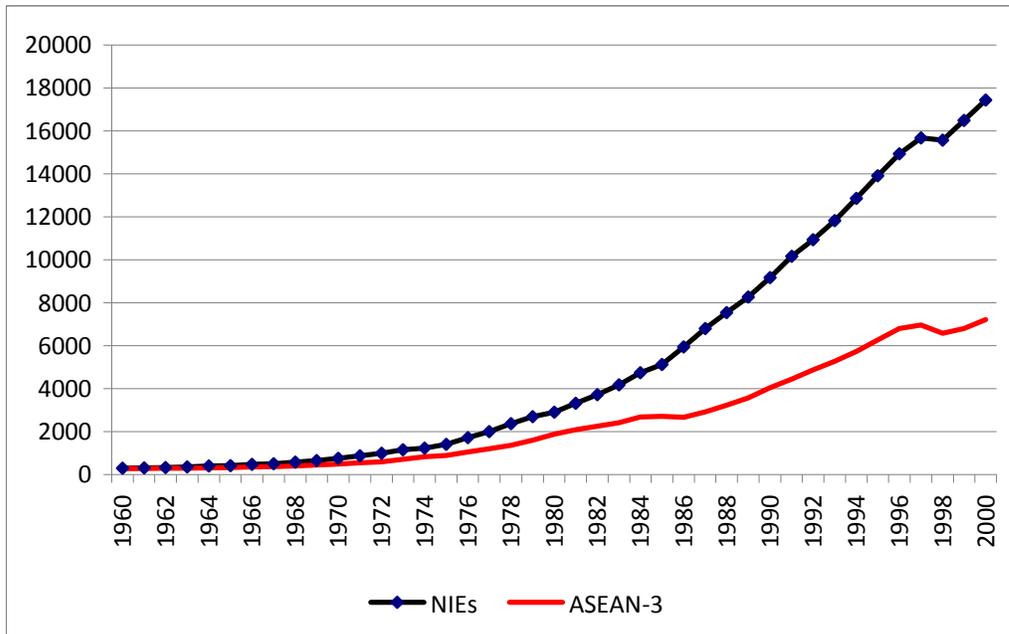


Figure 4: Percentage of Employment in the Agricultural Sector in Selected East Asian countries, Twenty Years of Sustained Growth



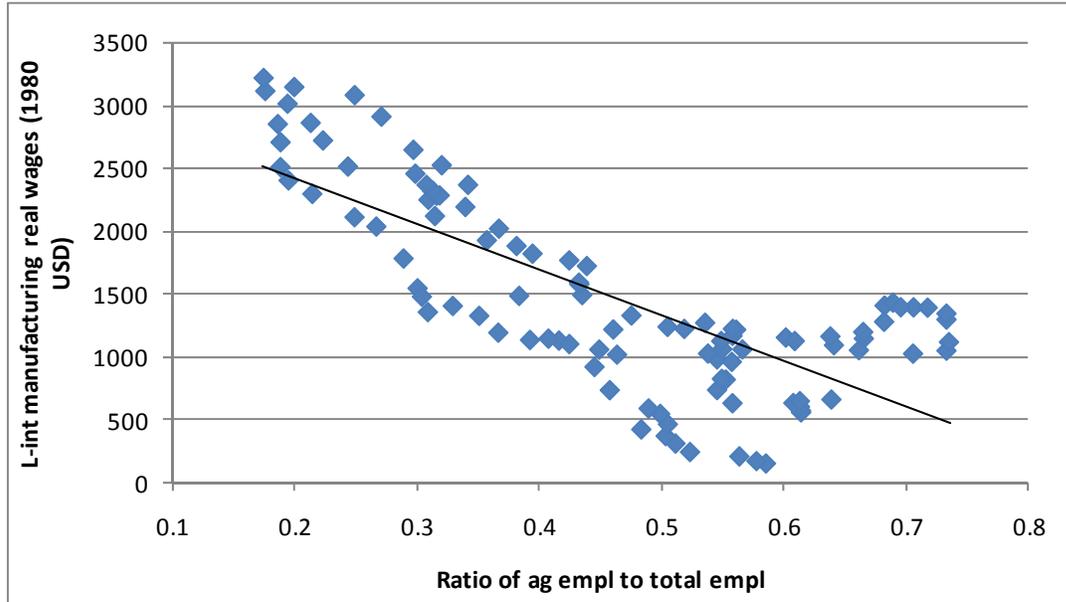
Source: ADB, *Key Indicators* (various years) and annual statistical yearbooks for individual countries and years (for agricultural employment data).

Figure 5: Real GDP per capita in the NIEs and ASEAN-3s, 1960-2000



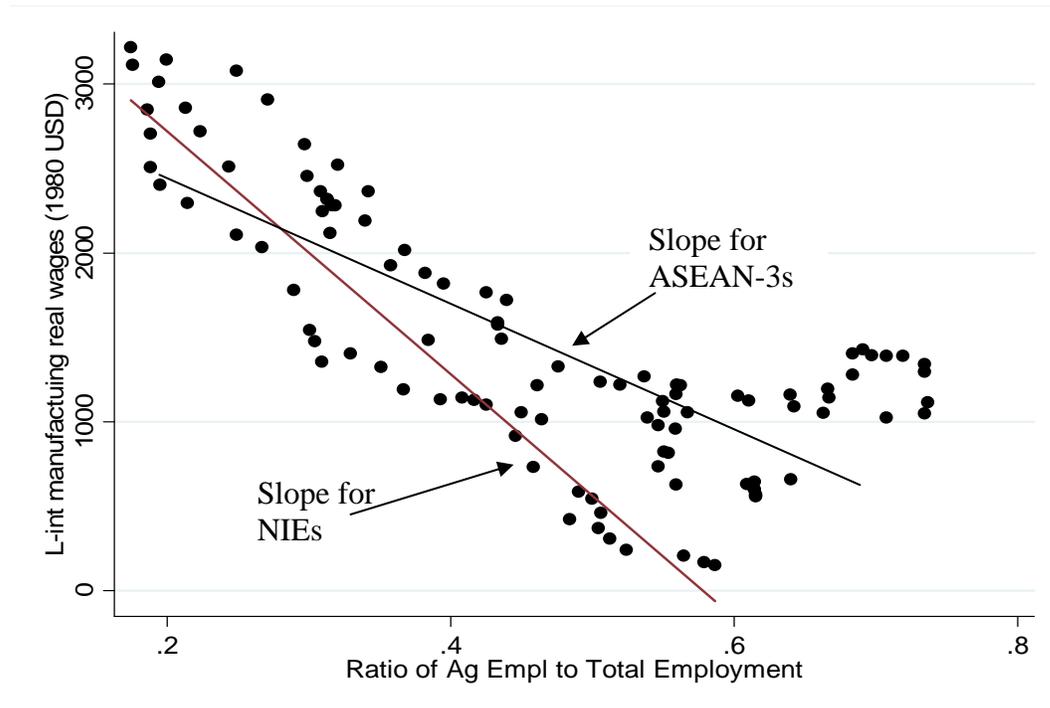
Source: Penn World Tables, Heston et al. (2006).

Figure 6: Real L-Intensive Manufacturing Wages Versus the Ratio of Agricultural to Total Employment



Source: Calculation based on data from UNIDO (2006), IMF International Financial Statistics, ADB, *Key Indicators* (various years) and annual statistical yearbooks for individual countries and years (for agricultural employment data).

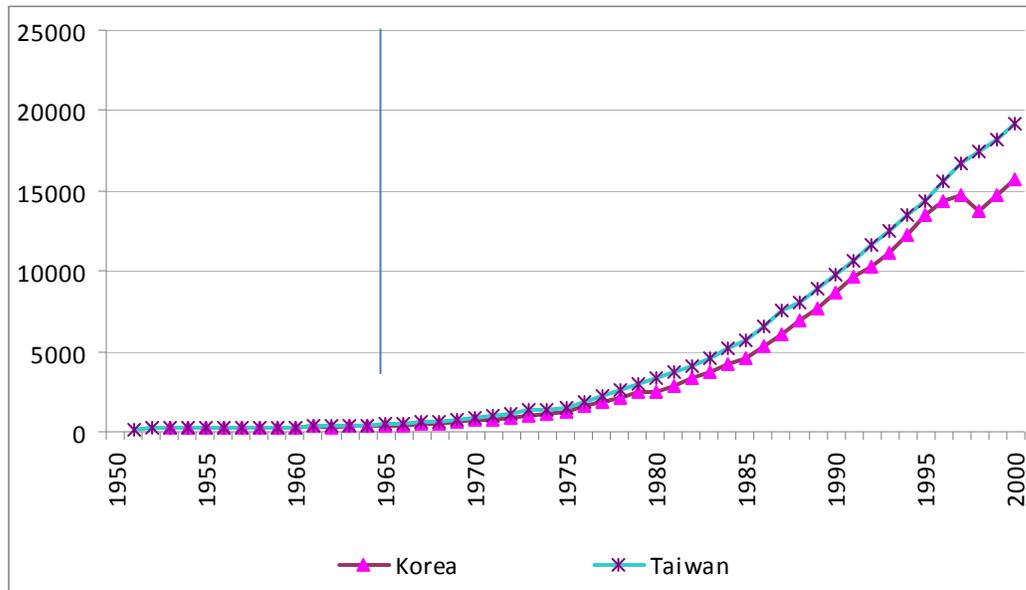
Figure 7: Explaining the Results: real L-intensive manufacturing wages versus the ratio of agricultural to total employment, the difference between the NIEs and ASEAN-3



Source: See Figure 6. Slope estimates based on regressions with interactive sub-regional dummy variables.

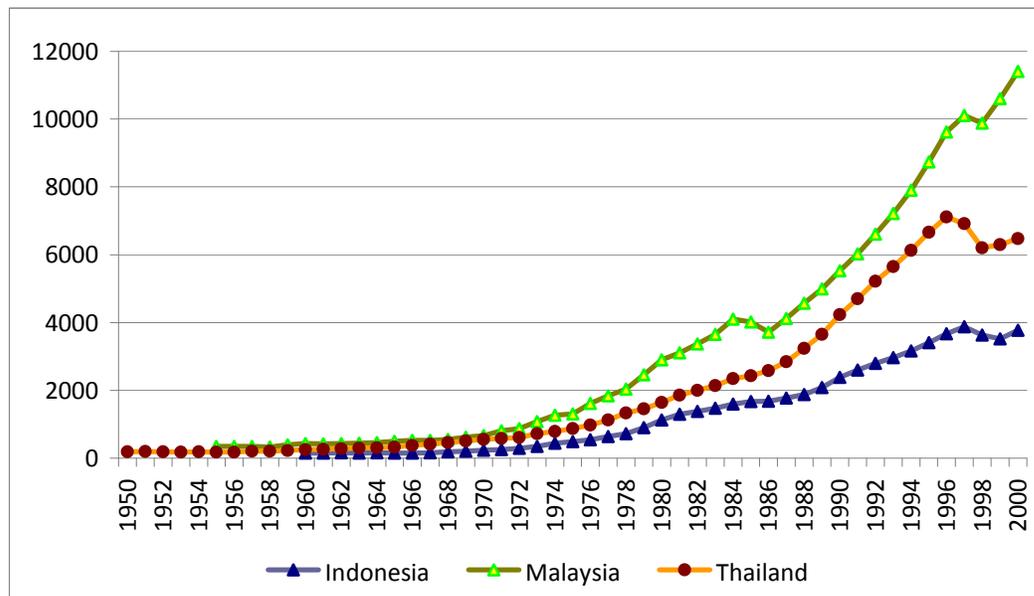
Appendix A: Additional Figures and Tables

Figure A-1: Real GDP per capita in the NIEs, 1950-2000



Source: Penn World Tables, Heston et al. (2006).

Figure A-2: Real GDP per capita in the ASEAN-3s, 1950-2000



Source: Penn World Tables, Heston et al. (2006).

Annex Table 1
Ratio of Agricultural Value Added Relative to All Other Sectors, the NIEs and the
ASEAN-3 Countries, First 20 Years of Accelerated Economic Growth

	<i>Years</i>	Korea	Taiwan	<i>Years</i>	Indonesia	Malaysia	Thailand
YR1	1965	0.42	0.44	1975		0.45	
YR2	1966	0.38	0.44	1976		0.43	
YR3	1967	0.33	0.42	1977	0.28	0.46	0.12
YR4	1968	0.25	0.41	1978	0.27	0.44	0.12
YR5	1969	0.26	0.36	1979	0.22	0.43	0.13
YR6	1970	0.27	0.38	1980	0.26	0.45	0.12
YR7	1971	0.30	0.32	1981	0.19	0.47	0.11
YR8	1972	0.25	0.34	1982	0.26	0.50	0.11
YR9	1973	0.22	0.38	1983	0.24	0.55	0.11
YR10	1974	0.23	0.38	1984	0.24	0.56	0.09
YR11	1975	0.26	0.40	1985	0.25	0.57	0.09
YR12	1976	0.27	0.38	1986	0.26	0.59	0.09
YR13	1977	0.27	0.39	1987	0.25	0.59	0.10
YR14	1978	0.29	0.38	1988	0.23	0.58	0.10
YR15	1979	0.33	0.48	1989	0.22	0.58	0.09
YR16	1980	0.26	0.48	1990	0.19	0.54	0.08
YR17	1981	0.31	0.47	1991	0.19	0.64	0.10
YR18	1982	0.31	0.46	1992	0.20	0.70	0.09
YR19	1983	0.32	0.40	1993	0.21	0.71	0.09
YR20	1984	0.37	0.37	1994	0.24	0.71	0.10
YR21	1985	0.40	0.39	1995	0.26	0.65	0.12

Source: Asian Development Bank, Key Indicators of Development in Asia, various years, and individual country statistical yearbooks, various years.

Annex Table 2
Descriptive statistics

<i>Variable</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
Real L-int wages	1,479	770	150	3,216
L-int exports (%)	28	18	2	65
L-int real output (millions)	8,880	8,450	287	43,300
L-int productivity	12,810	5,707	1,441	27,498
Ag empl share (%)	46	16	17	74

Notes: Real wages, output and productivity are expressed in 1980 USD.

Annex Table 3
Correlation coefficients of main variables

	<i>Real L-int wages</i>	<i>L-int exports</i>	<i>L-int real output</i>	<i>L-int productivity</i>
Real L-int wages	1			
L-int exports	0.5919	1		
L-int real output	0.6664	0.5811	1	
L-int productivity	0.9309	0.5189	0.7648	1
Ag empl share	-0.6342	-0.7749	-0.3587	-0.4683

Notes: Calculations are undertaken using the log of the variable so as to maintain a higher degree of consistency with the regression analysis. The log transformations do not generate significant differences in the correlation coefficients.

Appendix B: Data appendix

METHODOLOGY FOR DATA CLASSIFICATION

In this paper we concentrate on labour intensive manufacturing real wages and output as well as labour intensive manufacturing exports. Labour intensive output and wages are calculated using an ISIC classification as exemplified in Table A1. Labour intensive exports are calculated using the SITC classification as exemplified in Table A2.

Table B-1: Manufactured Goods Grouped by Skill-Intensiveness (ISIC 2)

Manufacture Classification	Examples	ISIC (Rev2) code
Agricultural and mineral resource intensive	Leather, food, beverages, tobacco, pulp, paper and paperboard, fertilizers and pesticides, pottery	311, 312, 313, 314, 323, 341, 353, 354, 361, 369, 372
Labour-intensive manufactures	Textile fabrics, clothing, footwear, glassware, travel goods, toys, plastic products.	321, 322, 324, 331, 332, 356, 362, 381, 390
Skilled-intensive manufactures	Chemical products, structural metal products, electrical industrial machinery, electrical appliances, railway road vehicles, sound recorders, telecommunications equipment.	351, 352, 381, 382, 383, 384, 385, 342, 355, 371,

Source: Classification based on Ariff and Hill (1985).

Table B-2: Manufactured Goods Grouped by Skill-Intensiveness (SITC2)

Manufacture Classification	Examples	SITC (Rev2) code
Natural resource based	Prepared meats/fruits, beverages, wood products, vegetable oils, base metals (except steel), petroleum products cement, gems, glass	012, 014, 023, 024, 035, 037, 046, 047, 048, 056, 058, 061, 062, 073, 098, 111, 112, 122, 233, 247, 248, 251, 264, 265, 269, 423, 424, 431, 621, 625, 628, 633, 634, 635, 641, 282, 288, 323, 334, 335, 411, 511, 514, 515, 516, 522, 523, 531, 532, 551, 592, 661, 662, 663, 664, 667, 681, 682, 683, 684, 685, 686, 687, 688, 689
Labour-intensive manufactures	Textile fabrics, clothing, footwear, leather manufactures, travel goods pottery, simple metal structures, furniture, jewellery, toys, plastic products.	611, 612, 613, 651, 652, 654, 655, 656, 657, 658, 659, 831, 842, 843, 844, 845, 846, 847, 848, 851, 642, 665, 666, 673, 674, 675, 676, 677, 679, 691, 692, 693, 694, 695, 696, 697, 699, 821, 893, 894, 895, 897, 898, 899
Medium-skill manufactures	Passenger vehicles and parts, commercial vehicles, motorcycles and parts, synthetic fibres, chemicals and paint, fertilizer, plastics, iron and steel, pipes and tubes, engines, motors, industrial machinery, pumps, ships, watches.	781, 782, 783, 784, 785, 266, 267, 512, 513, 533, 553, 554, 562, 572, 582, 583, 584, 585, 591, 598, 653, 671, 672, 678, 786, 791, 882, 711, 713, 714, 721, 722, 723, 724, 725, 726, 727, 728, 736, 737, 741, 742, 743, 744, 745, 749, 762, 763, 772, 773, 775, 793, 812, 872, 873, 884, 885, 951
High-skill manufactures	Data processing and telecommunications equipment, television sets, transistors, turbines, power generating equipment, pharmaceuticals, aerospace, optical and instruments, cameras.	716, 718, 751, 752, 759, 761, 764, 771, 774, 776, 778, 524, 541, 712, 792, 871, 874, 881

Source: Classification based on Lall (2000).

Definitions of main variables:

Manufacturing real wages

This study uses (the log of) real wages in 1984 US dollars using the following formula:

$$w_{i,t} = E_{i,B}^{US\$} \left(\frac{W_{i,t}}{1 + \left(\frac{CPI_{i,t} - CPI_{i,B}}{CPI_{i,B}} \right)} \right) \quad (\text{B-1})$$

where

$w_{i,t}$ is the real wage per worker of country i at time t expressed in base year, B , US

dollars,

$E_{i,B}^{US\$}$ is the base year US dollar per local currency of country i nominal exchange rate

(line rf from the International Monetary Fund, International Financial Statistics),

$W_{i,t}$ is the nominal wage per worker of country i at time t ,

$CPI_{i,t}$ is the consumer price index of country i at time t , and

$CPI_{i,B}$ is the corresponding consumer price index in the base year, where $B \equiv 1984$.

Consumer price indices come from line 63 of the International Monetary Fund,

International Financial Statistics. Overall, this measure reflects the remuneration that

workers obtain in the manufacturing industry. Manufacturing is defined according as

ISIC (Rev 2) commodities 31-39.

Sources: UNIDO (2006) and International Monetary Fund, International Financial

Statistics (<http://imfststatistics.org>).

Manufacturing real output

Manufacturing real output is calculated in the same way as real wages.

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