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Real Wage Trends and Labour Market Integration in the Informal Sector:
The Case of the Central Province in Sri Lanka

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TABLE OF CONTENTS

1.   INTRODUCTION

1.1   Objectives

Any analysis of development and poverty trends in a region must examine long-term trends in employment levels, real wages and labour market integration. Analysing trends in labour market integration is important because the spatial and sector-wise mobility of workers is key to their ability to respond to wage signals and take advantage of better wage-earning opportunities. As for the labour market itself, since the informal sector is the employment sector of the last resort for most poor, any study of poverty trends should include an analysis of labour market changes in this sector.

The present study, being part of a broader initiative to analyse development trends in Sri Lanka's Central Province, aims to throw further light on these issues by examining the following:

a)   real wage trends in the informal sector in Central Province, Sri Lanka, during the twenty years immediately following the economic liberalisation of 1978

b)   the extent of labour market integration between districts in Central Province; and,

c)   their implications for poverty reduction trends in the region.

The analysis focuses on the labour market experience of casual workers in agriculture and construction in the informal sector, usually to be found in the lower income deciles. Originally, the study intended to focus on wage rates among both males and females and, looking at trends in the male-female wage gap, but data constraints in Central Province Districts limited the analysis to wage rates of females in agriculture. Nevertheless, the study also looks at wage trends among unskilled male workers in masonry, both as a proxy indicator of long-term wage behaviour in the urban sector as well as an indicator of wage rates among unskilled males in Central Province.

The paper is organised as follows. Section 1 sets out the methodology used and discusses the data series. Section 2 sets the study in context with a discussion of employment trends in Central Province. Section 3 presents the study's findings on real wage trends in Central

Province's informal labour market and Section 4 sets out the study's findings on trends in labour market integration. Section 5 draws the implications of the findings for poverty and public policy and Section 6 concludes.

1.2   Methodology

The study adopts a cointegration approach to analyse real wage trends of female agricultural workers and unskilled male workers in masonry, and the extent of labour market integration in the informal agricultural and construction sectors in Central Province. It also examines the relationship between nominal wages and the rate of inflation by using Hsiao's (1981) sequential procedure. A detailed discussion of the methodologies used can be found in the companion study on 'Trends in Real-Producer Prices and Agricultural Market Integration in Central Province, Sri Lanka' (Gunatilaka 2000).

1.3   Data Series

The data series used in this study constitute, seasonally unadjusted quarterly daily wage series for females in informal sector agriculture, and for males in unskilled masonry, in Kandy, Matale and Nuwara Eliya Districts. The data is extracted from the Prices and Wages Statistics published periodically by the Central Bank of Sri Lanka. For the years when the data remained unpublished, they were obtained from the Prices and Wages Division of the Central Bank's Department of Statistics. The quarterly data series used for this study extend from the second quarter of 1979 to the last quarter of 1998. The two crop sectors were tea and paddy and the tasks were tea plucking and paddy transplanting, two activities in which a female labour force predominate. The wage series for masonry relates to the wages of unskilled males. The producer price series for paddy in Kandy and Matale Districts too, were obtained from the same source. Nominal series were converted to real series by deflating with the Colombo Consumers' Price Index (CCPI) series derived from the Annual Report of the Central Bank (various years).

While the Central Bank data is the only sufficiently long time series on informal sector wages available in Sri Lanka that permits cointegration analysis, it does suffer from some limitations. In the first place, the data is not derived from a stratified sample of workers. There are also data gaps. In 1988-89 the insurrectionary situation prevailing in the country precluded the collection of quarterly data on a district-wide basis. Nevertheless, annual averages are available. District-level data for 1994 and 1995 are unavailable as the records were destroyed by the LTTE's devastating bomb attack on the Central Bank in 1996. Hence, we have had to extrapolate from national level figures to make good these data gaps. Nevertheless, the overall length of the time series should mitigate these drawbacks.

2.   EMPLOYMENT TRENDS IN AGRICULTURE AND CONSTRUCTION, CENTRAL PROVINCE 1981-1997

At the time of the Census of 1981, an estimated 600,000 people were employed in Central Province. Sixteen years later, the numbers had risen to roughly 850,000 amounting to nearly a fifth of Sri Lanka's entire workforce (Table 1). Nearly half of all people employed in Central Province continued to work in Kandy District, 37 per cent of the total in Nuwara Eliya District, the rest in Matale District. However, there is little data to show what proportion of the employed work in the informal sector.

Table 1: Employment in Central Province 1981, 1997

| | Total Employment | | | | | |
| | 1981 | | | 1997 | | |
	Males	Females	Total	Males	Females	Total
Kandy	207306	72365	279671	295049	107379	402428
Matale	81325	21047	102372	100568	36632	137200
Nuwara Eliya	144531	100541	245072	177181	140721	317902
Total	433162	193953	627115	572798	284732	857530

| | Share in Total Employment (%) | | | | | |
| | 1981 | | | 1997 | | |
	Males	Females Province	Share in	Males	Females	Share in Province
Kandy	74	26	45	73	27	47
Matale	79	21	16	73	27	16
Nuwara Eliya	59	41	39	56	44	37
Total	69	31	100	67	33	100

Source: Department of Census and Statistics (1983), Census of Population 1981; and, (1999), District Profile of Labour Force in Sri Lanka 1997.

The proportion of all employed persons working in the agricultural sector, however, has declined markedly between 1981 and 1997 (Table 2). Even so, in 1997, nearly half of all people employed in Central Province worked in agriculture. The majority of them continued to be from Nuwara Eliya District, where absolute numbers of agricultural workers increased and, the district's share in total agricultural employment in the province rose. In Matale, numbers working in agriculture remained stable, suggesting that additions to the total workforce over the intervening years have tended to move out of agriculture, or even out of the district. From a share of 62 per cent in 1981, agriculture's contribution to total employment declined to 46 per cent in 1997. In Kandy, the numbers in agriculture declined in absolute terms, and Kandy now accounts only for a fourth of agricultural employment in the province whereas at the time of the Census, it accounted

for roughly a third. Nevertheless, we are unable to say whether the decline in the numbers employed in agriculture were in the formal or informal sector due to data constraints.

There are, however, important regional, gender-wise variations in agricultural employment. Note that, while females in Kandy District accounted for nearly a third of total employment in 1997 - a decline of 5 percentage points since 1981 - their contribution to agricultural employment has declined even more markedly from 59 per cent in 1981 to 29 per cent in 1997. In Matale, the absolute number of females in agriculture has increased marginally, but here too, their share in total employment has reduced substantially. In Nuwara Eliya there appears to be little significant change with absolute numbers of females in agriculture actually increasing even though their contribution to total female employment has declined marginally.

The ratio of female to male workers in agriculture in Central Province as a whole was equivalent to the same ratio in the island (two males for each female employed in the sector) in 1997. It is only in Kandy District that the ratio was closest to the national and provincial average. In Matale District, there were three male workers for every female worker employed in the sector, whereas in Nuwara Eliya District with its large female labour force, there were 1.3 males for every female employed.

The agricultural sector itself is segmented in terms of both crop and labour markets and there is little recent published data to show the distribution of workers among various sub-sectors even at national level (the most recent data is from the 1981 Census of Population). These agricultural sub-sectors are as follows: the tree crops sector consisting mainly of tea, the subsidiary crop sector consisting mainly of vegetables (particularly the production of up-country vegetables), and the peasant paddy sector. The tree crop sector itself may be divided into two more sub-sectors in terms of organisation of production: the large plantations sector owned and managed by private companies, and the rapidly growing, informal, smallholder sector.

Table 2: Agricultural Employment in Central Province 1981, 1997

Employment in Agriculture

	1981			1997		
	Males	Females	Total	Males	Females	Total
Kandy	77211	42818	120029	67947	30755	98702
Matale	47778	13086	60864	46416	16188	62604
Nuwara Eliya	104537	91798	196335	126844	121506	248350
Total	229526	147702	377228	241207	168449	409656

Employment Share in Agriculture (%)

	1981			1997		
	Males	Females	Share in Province	Males	Females	Share in Province
Kandy	64	36	32	69	31	24
Matale	78	28	16	74	26	15
Nuwara Eliya	53	47	52	51	49	61
Total	61	39	100	59	41	100

Agriculture's Share in Total Employment (%)

	1981			1997		
	Males	Females	Both Sexes	Males	Females	Both Sexes
Kandy	37	59	43	23	29	25
Matale	59	62	62	46	44	46
Nuwara Eliya	72	91	80	71	86	78
Total	53	76	60	42	59	48

Source: Calculated from Department of Census and Statistics (1983), *Census of Population 1981*; and, (1999), *District Profile of Labour Force in Sri Lanka 1997*.

The labour market too, may be divided into two sub-sectors: first, the organised, formal sector in the privately-owned (mainly) tea plantations, which are subject to minimum wage regulations, and where wages in excess of the minimum are traditionally determined through collective bargaining. Secondly, the focus of the present study, the informal, unregulated sector made up of casual unorganised workers, employed in paddy, vegetable and tree crop (small-holdings) sectors, whose wages are entirely market determined. Their numbers are unknown. Besides, workers in the plantations work as casual labourers in the informal sector as well, where informal sector wage rates apply.

The almost entirely informal construction sector is considerably smaller. In 1997, only 7.3 per cent, 5 per cent and 2.2 per cent of the total labour force in the Districts of Kandy, Matale and Nuwara Eliya respectively were employed in the construction sector. The majority of these workers were males and nearly two thirds were employed in Kandy District (Table 3). But note that the number in the construction sector has increased substantially since 1981, particularly in Kandy District. The sector is, however, a male-dominated sector. Unfortunately, there is no data on the numbers employed in the masonry sub-sector.

Table 3: Employment in Construction, Central Province 1981-1997

	Employment in Construction					
	1981			**1997**		
	Males	**Females**	**Total**	**Males**	**Females**	**Total**
Kandy	9511	562	10073	28412	811	29223
Matale	2246	86	2332	6537	374	6911
Nuwara Eliya	4133	191	4324	7049	100	7150
Total	15890	839	16729	41998	1285	43284

	Employment Shares in Construction (%)					
	1981			**1997**		
	Males	**Females**	**Total**	**Males**	**Females**	**Total**
Kandy	94	6	60	97	3	68
Matale	96	4	14	95	5	16
Nuwara Eliya	96	4	26	99	1	17
Total	95	5	100	97	3	100

Source: Calculated from Department of Census and Statistics (1983), *Census of Population 1981*; and, (1999), *District Profile of Labour Force in Sri Lanka 1997.*

To sum up, during the period 1981-1997, the approximate reference period of the present study, there have been substantial changes in employment trends in Central Province that are related to the agricultural and construction sectors. Although agriculture remains the largest employer, contributing to roughly 50 per cent of total employment in the Province, there appears to have been a significant movement of labour out of the sector. Kandy District largely accounts for this decline with proportionately more women moving out of agriculture than men. In Nuwara Eliya District, the numbers in agriculture have increased significantly even though their contribution to total employment has declined marginally. However, we are unable to say anything about changes in the distribution of workers between the formal and informal sectors due to data constraints. In contrast, absolute numbers and employment shares in construction have increased in Kandy and Matale Districts. In Nuwara Eliya District, however, even though numbers

have increased significantly, the contribution of the sector to total employment has declined.

3.   REAL WAGE TRENDS IN CENTRAL PROVINCE

The real wage rate is a key indicator of a worker's income earning capacity, even though earnings as a whole depend not only on wage rates but on employment in terms of number of days worked as well. In the case of casual (seasonal) workers in particular, the number of days worked is crucial to any analysis of their income levels. Nevertheless, trends in real wage levels among this group of workers are good proxy indicators of their employment prospects, with rising wage levels suggesting a tightening labour market and higher earnings - until, that is, the relative costs of labour and capital shift in favour of capital and mechanisation.

Sri Lanka's post 1977 economic liberalisation and the subsequent shift from import substitution to export promotion, is likely to have expanded the more labour-intensive industries, increased labour demand overall and driven up real wages in the long-run. But was this the experience in the three districts of Central Province as well?

To find out, we carried out stationarity tests on 8 real wage series. The econometric results are presented in Table 1A of the Appendix. The null hypothesis of non-stationarity was rejected in 6 series at the 5 per cent level of significance. Only the real wage series for paddy in Kandy District and masonry in Nuwara Eliya District proved non-stationary at the 5 per cent critical level, and the coefficient on the trend variable in both regressions were found to be positive and significant at the 5 per cent level.

Hence, the econometric analysis showed that real wages have stagnated in the tea sector in Kandy and Nuwara Eliya Districts, in the paddy sector in Matale and Nuwara Eliya, and in masonry in Kandy and Matale during the reference period. They have increased only in the paddy sector in Kandy District and in the masonry sector in Nuwara Eliya District, suggesting tightening labour market conditions (demand exceeding supply) in these regional sub-sectors (Table 4). The findings for Kandy District are consistent with the changes in female employment in the agricultural sector in the district presented in Section 2.

Table 4: Real Wage Trends in Central Province, 1979-1998

District	Sector	Real Wage Trend
Kandy	Tea	Stagnant
	Paddy	Rising, statistically significant
	Masonry	Stagnant
Matale	Paddy	Stagnant
	Masonry	Stagnant
Nuwara Eliya	Tea	Stagnant
	Paddy	Stagnant
	Masonry	Rising, statistically significant

Source: Table 1A in Appendix

As for comparative wage levels in the three districts, as Figs. 1, 2 and 3 in the Appendix show, wage rates of female tea pluckers in Kandy District have been almost consistently higher than wage rates in Nuwara Eliya District, perhaps due to a relatively tighter labour market in Kandy District than in the estates-dominated Nuwara Eliya District. In the paddy sector, too, wages in Nuwara Eliya have been lower than in either Kandy or Matale. Interestingly, until 1988 real wage rates in Matale were higher than in Kandy, but thereafter, Kandy wage rates have tended to be higher. In the masonry sector, Kandy wage rates have been higher than in Matale and Nuwara Eliya for most of the period. Wage rates in Nuwara Eliya have been lower than anywhere else for much of the period other than in the second half of the 1980s.

Graphical representation of real wage rates district-wise reveals that unskilled workers in masonry in all three districts earn higher wages than female workers in both the tea and paddy sectors. But in Kandy District paddy, sector wage rates appear slightly higher than wages in the tea sector, whereas in Nuwara Eliya District, tea sector wages appear higher.

Even though workers in the paddy sector in Kandy District, and in the masonry sector in Nuwara Eliya District have experienced rising real wages, signifying tightening labour markets in these sectors and greater mobility among such workers, the study's findings are cause for concern. For instance, Gunatilaka and Hewarathna's (2000) analysis of real wage trends at a national level (based on the combined national average of observed wage rates from the same data source as the present study) found that real wages of female agricultural workers in the tea and coconut sectors had risen between 1979 and 1997. But paddy wages were, as a whole, stagnant.

In contrast, generally stagnant wage rates in Central Province, especially in the tea sector, suggests that national level real wage trends may be dominated by more favourable real wage trends in other parts of the country, particularly in districts such as Galle in the economically more dynamic south. Meanwhile, the majority of informal sector workers in Central Province appear unable to access better employment opportunities suggesting

the existence of significant skills-related, institutional, and perhaps spatial barriers to labour market mobility out of the informal sector. We explore this theme further in the next section.

4. LABOUR MARKET INTEGRATION

We examined three issues in relation to labour market integration within Central Province. First, we examined whether wage differentials have narrowed during the reference period, signifying mobility of workers between districts and sectors at the margin. Secondly, we investigated whether wage rates in Central Province move together in the long-term notwithstanding short-term fluctuations away from each other. The existence of long-term relationships indicates the effective transmission of wage signals from one market to the other. Thirdly, we assessed whether wage rates influenced each other.

Accordingly, we carried out three kinds of econometric tests. First, we tested the wage differential series (defined as the difference in the log average of two wage series) for stationarity. Secondly, we carried out stationarity tests on the nominal wage series and tested them for long-term relationships using cointegration tests where appropriate. Thirdly, we carried out two-way causality tests on wage series using Hsiao's (1981) sequential procedure.

4.1 Trends in Wage Differentials Series

We examined the behaviour of wage differentials in order to test whether workers at the margin have become more spatially and sectorally mobile and hence, better able to move to jobs and areas that offer better wages.

Accordingly, we defined seven differential wage series within sectors but between districts and another seven differential wage series that were within each district but between sectors. We then tested them for stationarity using ADF unit root tests. Test results are presented in Tables 1C and 1D in the Appendix and in non-technical terms in Tables 5 and 6 below.

Of the intra-sector, inter-district differential wage series, all but one tested positively for stationarity at the 5 per cent significance level. The differential wage series in the paddy sector between Kandy and Matale Districts was found to be non-stationary at the 5 per cent critical level and, the positive sign of the mean of the dependent variable indicates that this gap has widened. This means that paddy wages in Kandy District have been rising faster than paddy wages in Matale District.

In contrast, constant gaps between all other district-level wage rates throughout the period is evidence of segmented district-wise labour markets: workers at the margin are not mobile between districts.

Table 5: Wage Differentials Within Sectors Between Districts

Markets	Wage Series	Econometric Results	Remarks
Kandy and Nuwara Eliya	Tea Plucking	Stationary	Constant gap throughout period
	Paddy Planting	Stationary	Constant gap throughout period
	Masonry	Stationary	Constant gap throughout period
Kandy and Matale	Paddy Planting	Non-stationary	Gap has widened with paddy wages in Kandy rising faster than paddy wages in Matale
	Masonry	Stationary	Constant gap throughout period
Matale and Nuwara Eliya	Paddy Planting	Stationary	Constant gap throughout period
	Masonry	Stationary	Constant gap throughout period

Source: Table 1C in Appendix

The results on inter-district wage differentials point to considerable market segmentation. For example, although tea sector wages are generally higher in Kandy District than in Nuwara Eliya District (Section 2), tea sector workers in Nuwara Eliya appear unable to move to Kandy to take advantage of the better wage opportunities. Likewise, paddy sector workers in Matale District appear unable to take up the better paying employment opportunities in Kandy District. The relative immobility of workers between districts in Central Province could be due to high travel costs, lack of information about casual employment opportunities in neighbouring districts, or institutional barriers to entry. On the other hand, especially where female workers are concerned, family ties and responsibilities, as well as issues of safety may constrain the distance that they can travel in search of work.

In the seven intra-district, inter-sector differential wage series, we found that three tested positively for non-stationarity at the 5 per cent level of significance. The rest were found to be stationary. Thus, paddy wages in Kandy have been rising faster than masonry wages. Tea wages in Kandy District have also been rising faster than masonry wages. However, in Nuwara Eliya District, the gap between paddy and masonry wages has widened with masonry wages rising faster than paddy wages. The differentials between all other wage series have remained constant.

The narrowing gap between paddy wages and masonry wages and, tea wages and masonry wages in Kandy District suggest the following processes at work. First, the decline in numbers employed in agriculture in the district over the period (Section 2) indicates a tightening agricultural labour market. At the same time, unskilled male workers may be moving out of the paddy sector into the better-paying masonry sector,

hence causing male wages in the paddy sector to rise. Since national level data shows a long-term relationship between male and female wage rates in the paddy sector and two way causality between them, female wages may be rising in response to increases in the male wage, particularly if female workers are increasingly taking up the work of males in that sector. These same processes appear to be working in the tea and masonry sectors in Kandy District.

These mechanisms, however, do not seem to be operating in Nuwara Eliya District where there is little mobility of workers across sectors, probably due to institutional barriers to entry. Hence, masonry wages there have risen faster than paddy wages.

Table 6: Wage Differentials Between Sectors, Within Districts

Markets	Wage Series	Econometric Results	Remarks
Kandy	Masonry and Paddy	Non-stationary	Gap has narrowed, paddy wages rising at a faster rate than masonry wages
	Masonry and Tea	Non-stationary	Gap has narrowed, tea wages rising faster than masonry wages
	Tea and Paddy	Stationary	Constant gap throughout reference period
Matale	Masonry and Paddy	Stationary	Constant gap throughout reference period
Nuwara Eliya	Masonry and Paddy	Non-stationary	Gap has widened, with masonry wages rising faster than paddy wages
	Masonry and Tea	Stationary	Constant gap throughout reference period
	Tea and Paddy	Stationary	Constant gap throughout reference period

Source: Table 1D in Appendix

Taken together, the analysis of wage differentials in Central Province suggest highly segmented labour markets. Nevertheless, a growing construction industry in Kandy District appeared to have exerted upward pressure on agricultural wage rates. As the demand for unskilled masons rose, it may have attracted male workers from the paddy and tea sectors from Kandy District itself, thereby exerting upward pressure on paddy wage rates in the district but dampening wage increases in the masonry sector.

Nevertheless, workers appear to be relatively immobile across districts. This could be due to gaps in information about job availability, inadequacies in the transport system or, as stated earlier, the spatial immobility of women workers due to family responsibilities. Thus, the study yields evidence of greater market integration in Kandy District between the paddy and masonry, and tea and masonry sectors. Constant gaps in most other differential wage series suggest little change in trends in labour market integration.

4.2   Long-term Relationships Between Wage Series

Tests for the existence of long-term relationships between series can be carried out only on series that are non-stationary and are integrated at the same level of difference. This does not, however, mean that there can be no long-term relationships between series that are stationary or are integrated at different levels of difference. In fact, a constant gap between two time series denoted by a constant differential indicates the existence of a long-term relationship between the two series. In Table 7 we reinterpret the results derived in the differential analysis discussed in Section 4.1 above in order to throw further light on this issue.

As for long-term relationships between series not analysed in terms of differentials in Section 4.1, we first tested all nominal wage series for stationarity and then tested those that were integrated at the same level of difference for cointegration. The stationarity tests are presented in Appendix Table 1B. Of the stationarity tests carried out on the eight nominal wage series, only two were found to be stationary at the 5 per cent critical level, the rest were found to be non-stationary at different levels of integration. Six pairs of wage series were then tested for cointegration again using ADF tests, and all tested positively for cointegration at the 5 per cent significance level (Appendix Table 2). The results are presented in non-technical terms in Table 7 below.

The key point to note is the existence of long-term relationships among most of the wage series, not only within sectors but also between districts. That is, of the 14 pairs of wage series analysed, 10 pairs moved together in the long-term. Three pairs masonry and paddy and, masonry and tea in Kandy District and paddy wages in Kandy and Matale Districts did not move together in the long-term. Test results for one other series proved inconclusive.

Table 7: Long-run Relationships Between Wage Series

Sectors	Districts	Econometric Results	Remarks
Tea	Kandy and Nuwara Eliya	Could not test for cointegration, but stationarity test on differential series showed constant gap	Long-term relationship as wage series moved together in the long-term
Masonry	Kandy and Matale	Could not test for cointegration, but stationarity test on differential series showed constant gap	Long-term relationship as wage series moved together in the long-term
	Kandy and Nuwara Eliya	Could not test for cointegration, but stationarity test on differential series showed constant gap	Long-term relationship as wage series moved together in the long-term
	Matale and Nuwara Eliya	Cointegrated	Long-term relationship as wage series moved together in the long-term
Paddy	Kandy and Matale	Could not test for cointegration, but stationarity test on differential series showed constant gap	No long-term relationship

Table 7: cont…

District	Sectors	Econometric Results	Remarks
Paddy	Kandy and Nuwara Eliya	Could not test for cointegration, but stationarity test on differential Series showed constant gap	Long-term relationship as wage series moved together in the long-term
	Matale and Nuwara Eliya	Cointegrated	Long-term relationship as wage series moved together in the long-term
Kandy	Masonry and Paddy	Could not test for cointegration, but stationarity test on differential series showed constant gap	No long-term relationship
	Masonry and Tea	Could not test for cointegration, but stationarity test on differential series showed constant gap	No long-term relationship
	Tea and paddy	Could not test for cointegration, but stationarity test on differential series showed constant gap	Long-term relationship as wage series moved together in the long-term
Matale	Masonry and Paddy	Cointegrated	Long-term relationship as wage series moved together in the long-term
Nuwara Eliya	Masonry and Paddy	Cointegrated but stationarity test on differential series showed narrowing gap	Test results inconclusive
	Masonry and Tea	Could not test for cointegration, but stationarity test on differential series showed constant gap	Long-term relationship as wage series moved together in the long-term
	Tea and Paddy	Could not test for cointegration, but stationarity test on differential series showed constant gap	Long-term relationship as wage series moved together in the long-term

Source: Tables 1C, 1D and 2 in Appendix

We also wanted to investigate whether the producer price of rice was in any way related to paddy wages, hence we tested the nominal paddy producer price series for Kandy and Matale Districts for stationarity using ADF unit root tests. Both were found to be non-stationary at the 5 per cent level of significance (Table 1E in Appendix). However, we were unable to test for long-term relationships between paddy wage rates and paddy producer prices as the wage series were not integrated at the same level of difference.

Thus, as most wage series moved together in the long-term in the three districts, the evidence suggests effective transmission of price (wage) signals between markets. However, the evidence on labour market integration, derived from the long-term behaviour of wage differential series suggests, that workers at the margin do not move in response to these signals, other than in Kandy District.

4.3   Causal Relationships Between Wage Series

The extent to which wage series respond to changes in other wage series is yet another indicator of market integration. To test this we used Hsiao's (1981) sequential procedure on wage series, using error correction models where the series were found to be cointegrated. The results are set out in Tables 3, 4 and 5 in the Appendix.

Of the twelve causality tests carried out on the cointegrated series, only three tested positively for causality. Thus, in Matale District, female paddy wages appear to influence wages of unskilled males in masonry, but not vice versa. Likewise, in Nuwara Eliya District female paddy wages appear to influence wages of unskilled males in masonry. There is also evidence of reverse causality, as masonry wages appear to influence paddy wages. Apart from these three exceptions, all other cointegrated wage series appear to be driven by variables other than corresponding wage rates in neighbouring districts or other sectors within the same district.

As for causality among the non-cointegrated series, tests proved positive at the 5 per cent critical level only in three cases. Female wages for tea plucking in the Kandy District seemed to influence corresponding wage rates in Nuwara Eliya District, but not the other way round. Female wages for paddy in Kandy District appeared to influence wage rates for masonry in the same district, but not vice versa, and female wages in the tea sector in Kandy District seemed to influence masonry wage rates in the same district.

We also found evidence of a long-term relationship between masonry wages in Matale and paddy wages in Nuwara Eliya, masonry wages in Nuwara Eliya and paddy wages in Matale (Table 8). It is likely that all four wage series are driven by some other variable as there is no causality between them.

Table 8: Other Long-Term Relationships and Causality

Districts	Sectors	Econometric results	Causality
Matale and Nuwara Eliya	Masonry and Paddy	Cointegrated- long-term relationship between wage rates	No causality
Nuwara Eliya and Matale	Masonry and Paddy	Cointegrated- long-term relationship between wage rates	No causality

Source: Tables 2 and 3 in Appendix

Thus, most wage series in Central Province, though moving together in the long term do not appear to be influenced by each other. They appear driven by exogenous factors. Results of the analysis on long-term relationships, wage differentials and causal relationships among wage rates in Central Province are summarised and presented in Table 9 for easy reference.

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[2] Of 32 causality tests conducted, only 6 proved positive. Matale paddy wages seem to influence Matale masonry wages, Nuwara Eliya paddy and masonry wages seem to influence each other, Kandy tea wages seem to influence Nuwara Eliya tea wages, and Kandy masonry wages seem to be influenced by both paddy and tea wages in the same district

17

5. IMPLICATIONS FOR POVERTY AND POLICY

The above analysis of long-term trends in the informal labour markets of Central Province yielded key findings about the movement of real wages and long-term dynamics in market integration.

At first glance, the findings on real wage trends reveal little economic dynamism in Central Province's informal sector. In most sectors and districts, nominal wage rates have adjusted to inflationary pressures just enough to keep real wages constant. On the other hand, it may well be that upward pressures on economy-wide general real wage rates exerted by increased labour demand following economic liberalisation have been dampened in Central Province due to excess labour supply. As the more dynamic sectors of the economy attracted better skilled, more mobile workers, the rest may have been crowded into the informal agriculture and construction sectors.

Table 9: Summary of Long-term Relationships, Trends in Wage Differentials and Causality

A: Within Sectors Between Districts

Sector	Districts	Long-term Relationships	Behaviour of Wage Differential	Causality
Tea	Kandy and Nuwara Eliya	Long-term relationship	Constant differential between wage rates	Nuwara Eliya wage rates do not influence Kandy wage rates, but Kandy wage rates influence Nuwara Eliya wage rates.
Paddy	Kandy and Matale	No long-term relationship	Gap between wage rates has widened	Neither wage rate influences the other.
	Kandy and Nuwara Eliya	Long-term relationship	Constant differential between wage rates	Neither wage rate influences the other.
	Matale and Nuwara Eliya	Long-term relationship between wage Rates	Constant differential between wage rates	Neither wage rate influences the other
Masonry	Kandy and Matale	Long-term relationship	Constant differential between wage rates	Neither wage rate influences the other.
	Kandy and Nuwara Eliya	Long-term relationship	Constant differential between wage rates	Neither wage rate influences the other.
	Matale and Nuwara Eliya	Long-term relationship between wage rates	Constant differential between wage rates	Neither wage rate influences the other

B: Within District Between Sectors

District	Sectors	Long-term Relationships	Behaviour of Wage Differential	Causality
Kandy	Masonry and Paddy	No long-term relationship	Wage rates have moved closer to each other rates.	Masonry wage rates do not influence paddy wage rates, but paddy wage rates influence masonry wage
	Masonry and Tea	No long-term Tea	Wage rates have moved closer to each other	Tea wage rates influence masonry wage rates but masonry wage rates do not influence tea wage rates.
	Tea and Paddy	Long-term relationship	Constant differential between wage rates	Neither wage rate influences the other.
Matale	Masonry and Paddy	Long-term relationship	Constant differential between wage rates	Paddy wage rate influences wage rate for masonry but not the other way round.
Nuwara Eliya	Masonry and Paddy	Test results inconclusive	Gap between wage rates has widened	Both wage rates influence each other.
	Tea and Paddy	Long-term relationship	Constant differential between wage rates	Neither wage rate influences the other
	Tea and Masonry	Long-term relationship	Constant differential between wage rates	Neither wage rate influences the other

Stagnant real wage rates augur ill for consumption poverty line reduction among this group of unskilled, informal sector workers, particularly if, during the reference period, households whose principal source of income was casual, informal sector wage employment were unable to diversify their income sources. Even so, rising real wages in the paddy sector in Kandy District and in the masonry sector in Nuwara Eliya District suggest pockets of economic dynamism in the urban sector. This is further evidenced by trends in nominal wage differentials. Both nominal paddy wages and tea wages in Kandy District have been rising faster than masonry wages, suggesting tightening labour markets in the paddy and tea sectors in Kandy District and movement of workers from the (rural) tea and paddy sectors to the masonry sector (non-farm, urban) at the margin. Given the male-dominated nature of the construction industry (Table 3), it may well be that unskilled males in the paddy and tea sectors are moving into the masonry sector, dampening nominal wage increases in that sector but causing wages to rise in the paddy and tea sectors. As males leave, women may well substitute for them, thereby causing female wage rates in these two sectors to rise. Nevertheless, while real wages of unskilled masons in Nuwara Eliya have risen, there appears to have been little movement of workers between sectors within the district. Hence, in Nuwara Eliya District, unlike in Kandy District, informal labour markets appear largely segmented.

In fact, even though most wage rates in Central Province move together in the long term, they do not appear to be influenced by each other apart for a few exceptions. Moreover, between-districts wage differential analysis suggests highly segmented labour markets in Central Province, indicating that spatial, skills-related and institutional barriers to mobility may be key factors associated with the poverty commonly experienced among this group of workers.

Hence, to proceed from the present analysis to formulating appropriate policies to respond to the problems of poverty faced by such workers, it would be first necessary to identify key characteristics that may make them relatively immobile.

Thus, further research should adopt a two-pronged approach. It should first use the Sri Lanka Integrated Survey (1999-2000) data for Central Province to identify the socio-economic characteristics of this group of workers and assess the extent of poverty among them. In particular, the Integrated Survey data should be analysed to examine the following issues:

a) the proportion of informal sector male and female workers in total employment in the three districts of Central Province;

b) their characteristics in terms of religion and ethnicity, income, skill and education levels, assets, access to services including infrastructure, transport and social services;

c) the proportion of such households that fall below the consumption poverty line; and,

d) sources of income of households where the principal income earner is a casual, informal sector worker.

The second prong of the follow-up research should use the proposed JIMOD household survey to investigate the following:

e) employment choices (farm/non-farm, within district/neighbouring districts/Colombo Metropolitan/other region/abroad), including migration, that such workers/households face; and,

f) constraints to employment and mobility (assets, skills, capital, technology, markets, transport, networks and information, age, ethnicity, gender, family responsibilities in home village, high rentals in migration destinations).

It is also recommended that the household survey questionnaire should include questions on inter-generational spatial and occupational mobility in order to assess the long-term dynamics of occupational mobility. Given the district-wise differences in real wages and labour market integration outcomes highlighted in the present study, the qualitative survey should focus on the reasons for these district-wise differences.

6. CONCLUSIONS

This study sought to analyse real wage trends in the informal agriculture and construction sectors in Central Province between 1979 and 1998 and analyse the extent of labour market integration within the region.

Key findings of the analysis are as follows:

1. real wages in Central Province have been largely stagnant over the reference period other than in the paddy sector in Kandy District and the masonry sector in Nuwara Eliya District where real wages have been rising.

2. while most wage rates in the region appear to move together, they do not seem to influence each other, apart from a few exceptions.

3. as for trends in labour market integration, only Kandy District's informal labour market seems to have become better integrated with more mobility among workers over the reference period.

4. Other than for this exception, both district and sector-wise labour markets in Central Province appear highly segmented, suggesting significant spatial, skills-related, and institutional barriers to labour mobility.

The study's findings have serious negative implications for poverty reduction in the region. If workers are unable to move to take advantage of better wage-earning opportunities in economically dynamic sectors and regions, then they are unlikely to experience improvement in incomes. The study recommends further research that will throw light on the survival strategies adapted by such groups, the choices they face, and the individual and community-based characteristics and constraints to their spatial and occupational mobility. Appropriate policy responses to reduce poverty and increase opportunities for employment and income generation need to be based on the findings of such research analysis.

APPENDIX

Definitions of Data Series

Data series related to two crop sectors, tea and paddy and the tasks were tea plucking and paddy transplanting. All wage series are considered in logarithmic form and the relevant log-average wage series are defined as follows:

Variable	Definition
Nominal Wage Rates	
KTF	Nominal wage series for females in tea sector, Kandy District
NTF	Nominal wage series for females in tea sector, Nuwara Eliya District
KPF	Nominal wage series for females in paddy sector, Kandy District
MPF	Nominal wage series for females in paddy sector, Matale District
NPF	Nominal wage series for females in paddy sector, Nuwara Eliya District
KM	Nominal wage series for unskilled males in masonry, Kandy District
MM	Nominal wage series for unskilled males in masonry, Matale District
NM	Nominal wage series for unskilled males in masonry, Nuwara Eliya District
Real Wage Rates	
KTFR	Real wage series for females in tea sector, Kandy District
NTFR	Real wage series for females in tea sector, Nuwara Eliya District
KPFR	Real wage series for females in paddy sector, Kandy District
MPFR	Real wage series for females in paddy sector, Matale District
NPFR	Real wage series for females in paddy sector, Nuwara Eliya District
KMR	Real wage series for unskilled males in masonry, Kandy District
MMR	Real wage series for unskilled males in masonry, Matale District
NMR	Real wage series for unskilled males in masonry, Nuwara Eliya District
Inter-district, Intra-sectoral differential wage series	
TFKN	Wage differential in tea sector between Kandy and Nuwara Eliya Districts
PFKM	Wage differential in paddy sector between Kandy and Matale Districts
PFKN	Wage differential in paddy sector between Kandy and Nuwara Eliya Districts
PFMN	Wage differential in paddy sector between Matale and Nuwara Eliya Districts
MKM	Wage differential in masonry sector between Kandy and Matale Districts
MKN	Wage differential in masonry sector between Kandy and Nuwara Eliya Districts

Variable	Definition
Intra-district, Inter-sectoral Differential wage series	
MMN	Wage differential in masonry sector between Matale and Nuwara Eliya Districts
KKMP	Wage differential between masonry and paddy sectors, Kandy District
KKTM	Wage differential between tea and masonry sectors, Kandy District
KKTP	Wage differential between tea and paddy sectors, Kandy District
MMPF	Wage differential between masonry and paddy sectors, Matale District
NNMP	Wage differential between masonry and paddy sectors, Nuwara Eliya District
NNMT	Wage differential between masonry and tea sectors, Nuwara Eliya District
NNTP	Wage differential between tea and paddy sectors, Nuwara Eliya District
Nominal Producer Price Series	
KSP	Nominal paddy producer price series, Kandy District
MSP	Nominal paddy producer price series, Matale District

Table 1: Augmented Dickey-Fuller Tests for Non-stationarity

A: Real Wages

Variable	ADF Test Lag Length	Without trend	With trend
KTFR[(D)]	1	-3.9693*	-5.2819*
NTFR	1	-2.6789	-3.8672*
KPFR	1	-2.0129	-3.1515
MPFR	1	-7.15*	-7.3891*
NPFR	1	-3.3763*	-4.1046*
KMR	1	-3.6611*	-4.7440*
MMR	0	-3.7128*	-4.1184*
NMR	1	-1.6176	-2.6475

[(D)] A dummy variable D=0 for the period 1979(2) to 1983(2), D=1 from 1983(3) to 1985(3), and D=0 from 1985(4) onwards is included in the model.

B: Nominal Wages

Variable	ADF Test Lag Length	Without trend	With trend
KTF	1	-1.4722	-3.1019
NTF	1	-0.72867	-4.0193*
KPF	2	-1.1117	-0.44180
MPF	3	-0.11699	-1.8417
NPF	3	-0.33432	-2.3866.
KM	1	-1.9436	-4.4389*
MM	3	-0.17759	-2.0423
NM	3	-0.71214	-3.3788

C: Differential Wage Series, Inter-district and Intra-sector

Variable	Lag Length	ADF Test Without constant	With constant	Mean of Dependent Variable
TFKN	2	-1.5639	-3.1052*	
PFKM	3	-1.9479	-1.9302	0.0048603
PFKN	3	-0.45734	-3.3492*	
PFMN	1	-1.5639	-3.9932*	
MKM	1	-4.2494*	-4.2652*	
MKN	1	-3.2713*	-3.6389*	
MMN	1	-3.0065*	-3.39*	

D: Differential Wage Series, Intra-district and Inter-sector

Variable	Lag Length	ADF Test Without constant	With constant	Mean of Dependent Variable
KKMP	2	-1.0698	-2.8364	-0.0030393
KKMT	1	-1.6494	-2.9311	-0.0028783
KKTP	1	-3.2762*	-3.2800*	
MMPF	3	-0.32534	-3.5339*	
NNMP	3	0.17089	-2.4225	0.0069027
NNMT	2	-0.10353	-3.1752*	
NNTP	1	-3.5349*	-4.3370*	

E: Paddy Producer Price Series

Variable		ADF Test	
	Lag Length	Without constant	With constant
KSP	6	-1.2250	1.9241
MSP	6	-0.9801	-2.4182

Note: The Augmented Dickey-Fuller (ADF) technique tests H_0: x - I(1) Vs. H_1: x I(0). The 5 per cent ADF critical values for with constant and without trend and with constant and with trend are 2.93 and 3.5 respectively.

Table 2: Testing for Cointegration

Variable	CRDW	ADF	Remarks
MM and NM	0.7982*	-3.4275*	CI
MM and MPF	1.8040*	-6.0312*	CI
MM and NPF	0.99215*	-3.5797*	CI
MPF and NPF	1.4260*	-4.2724*	CI
MPF and NM	1.4515*	-4.3957*	CI
NM and NPF	0.78219*	-3.3221*	CI

Note: The 5 per cent CRDW and ADF critical values are 0.39 and 3.17 respectively.

Table 3: Causality Tests Error Correction Models

The final predictive errors, F-statistics of H_0: $\gamma_1 = 0 \ldots = \gamma_0 = 0$ against H_1: at least one $\gamma \neq 0$ and t-ratio of H_0: b = 0 against H_1: $\beta \neq 0$.

Model 2: $\quad \Delta y_t = \alpha + \beta z_{t-1} + \sum_{j=1}^{m} \delta_j \Delta y_{t-j} + \varepsilon_t$

Model 3: $\quad \Delta y_t = \alpha + \beta z_{t-1} + \sum_{j=1}^{m} \delta_j \Delta y_{t-j} + \sum_{i=0}^{n} \gamma_i \Delta x_{t-i} + \varepsilon_t$

Controlled Variable ΔY (m)	Manipulate Variable ΔX	Lag Length of ΔX n	FPE of (2), $FPE_{\Delta Y}(m,0)$ x 10^{-3}	FPE of (3), $FPE_{\Delta Y}(m,n)$ x 10^{-3}	t-ratio of β in (3)	Comments	F-statistics
MM	NM	4	6.6608	6.513	1.5747	C	1.8713
NM	MM	0	2.373	2.386	-3.2017	NC	0.6002
MM	NPF	0	6.435	6.46	-2.0460	NC	1.6451

Table 3: cont…

Controlled Variable ΔY (m)	Manipulate Variable ΔX	Lag Length of ΔX n	FPE of (2), $FPE_{\Delta Y}(m,0)$ x 10^{-3}	FPE of (3), $FPE_{\Delta Y}(m,n)$ x 10^{-3}	t-ratio of β in (3)	Comments	F-statistics
NPF	MM	0	23.454	24.142	-0.42736	NC	0.1123E-5
MM	MPF	2	6.031	5.15	-4.5885	C	5.4151*
MPF	MM	4	10.614	0.113	1.4187	C	0.84271
MPF	NPF	0	10.054	9.965	-2.5364	C	1.5783
NPF	MPF	0	23.533	23.160	1.4201	C	2.1264
MPF	NM	1	10.17	10.04	-1.7466	C	2.3127
NM	MPF	0	2.54	2.517	2.4646	C	1.6835
NM	NPF	5	2.69	2.10	-2.7163	C	5.3641*
NPF	NM	0	23.153	20.357	2.0321	C	10.6245*

Table 4: Causality Tests Models in First Differences

Model 4: $\Delta y_t = \alpha + \sum_{j=1}^{m} \delta_j \Delta y_{t-j} + \varepsilon_t$

Model 5: $\Delta y_t = \alpha + \sum_{j=1}^{m} \delta_j \Delta y_{t-j} + \sum_{i=0}^{n} \gamma_i \Delta x_{t-i} + \varepsilon_t$

Controlled Variable ΔY (m)	Manipulate Variable ΔX	Lag Length of ΔX n	FPE of (4), $FPE_{\Delta Y}(m,0)$ x 10^{-3}	FPE of (5), $FPE_{\Delta Y}(m,n)$ x 10^{-3}	Comments	F-statistics
KPF	MPF	0	12.441	12.489	NC	0.727
MPF	KPF	4	10.17	10.4	C	2.162
KPF	NPF	0	12.441	12.593	NC	0.148
NPF	KPF	0	23.45	23.49	NC	1.018
KPF	KSP	0	12.441	12.551	NC	0.374
KSP	KPF	1	10.912	10.981	NC	1.205
MPF	MSP	0	10.17	10.617	NC	1.874
MSP	MPF	0	8.881	8.644	C	2.782*

Table 5: Causality Tests Models in First Differences and Levels

The final predictive errors and F-statistics of $H_0: \gamma_1 = 0 \ldots = \gamma_0 = 0$ against H_1: at least one $\gamma \neq 0$.

Model 6: $\Delta Y_t = \alpha + \sum_{j=1}^{m} \delta_j \Delta Y_{t-j} + \varepsilon_t$

Model 7: $\Delta Y_t = \alpha + \sum_{j=1}^{m} \delta_j \Delta Y_{t-j} + \sum_{i=0}^{n} \gamma_i X_{t-i} + \varepsilon_t$

Controlled Variable ΔY (m)	Manipulate Variable X	Lag Length of X n	FPE of (6), $FPE_{\Delta Y}(m,0)$ x 10^{-3}	FPE of (7), $FPE_{\Delta Y}(m,n)$ x 10^{-3}	Comments	F-statistics
KTF	NTF	1	22.621	22.322	C	1.879
MM	KM	0	6.031	6.696	NC	0.883
NM	KM	0	2.69	2.685	NC	0.238
KPF	KM	0	12.441	12.508	NC	0.628
KTF	KM	4	22.621	22.656	NC	1.657
NPF	NTF	0	23.454	23.849	NC	0.0085
NM	NTF	0	2.69	2.691	NC	0.0901

Model 8: $Y_t = \alpha + \sum_{j=1}^{m} \delta_j Y_{t-j} + \varepsilon_t$

Model 9: $Y_t = \alpha + \sum_{j=1}^{m} \delta_j Y_{t-j} + \sum_{i=0}^{n} \gamma_i \Delta X_{t-i} + \varepsilon_t$

Controlled Variable Y (m)	Manipulate Variable ΔX	Lag Length of ΔX n	FPE of (8), $FPE_Y(m,0)$ x 10^{-3}	FPE of (9), $FPE_Y(m,n)$ x 10^{-3}	Comments	F-statistics
NTF	KTF	5	6.306	5.708	C	2.7455*
NTF	NPF	0	6.306	6.285	C	1.228
KM	MM	0	3.46	3.463	NC	0.947
KM	NM	1	3.46	3.474	NC	1.282
KM	KPF	0	3.46	3.331	C	3.557*
KM	KTF	0	3.46	3.36	C	2.892*
NTF	NM	0	6.306	6.214	C	2.007

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