What Really Happens to Wage Rates During Financial Crises? The Case of Thailand

by

Jere R. Behrman, Anil B. Deolalikar and Pranee Tinakorn*

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*Jere R. Behrman is the William R. Kenan, Jr. Professor of Economics and Director of the Population Studies Center, University of Pennsylvania (jbehrman@econ.sas.upenn.edu); Anil B. Deolalikar is Professor of Economics, University of Washington, (anil@u.washington.edu); and Pranee Tinakorn is an Economics Research Specialist at the Thailand Development Research Institute Foundation (TDRI) and an Associate Professor of Economics at Thammasat University, Bangkok (pranee@tdri.or.th). This paper builds upon work in Behrman, Deolalikar, Tinakorn and Chandoevwit (2000) that was prepared for the World Bank by TDRI. The authors alone -- and not TDRI nor the World Bank -- are responsible for all interpretations in this paper. The authors thank Dr. Worawan Chandoevwit and Mr. Rangsiman Kingkaew for research and computational assistance on this project.

Section 1. Introduction

For most members of developing countries that experience negative macro shocks, such as the Asian financial crisis of the late 1990s or the "lost decade" of the 1980s in much of Latin America and Africa, the most important manifestations of the macro shocks are through the labor market. This is the case because the most important earning asset of most members of such societies -- particularly for the poorer members of these societies -- is their labor.

Therefore it is important to understand better the effects of the economic crises on labor markets. There are a number of previous studies on related topics, recently particularly pertaining to the Asia financial crisis, including ones in which the present authors have been involved.[1] But on one basic empirical question there is considerable disagreement. What happened to real wage rates due to macro shocks?

This is a matter of considerable importance for four reasons. First, as noted, labor markets are the major source of income for the majority of people in almost all countries. Therefore what happened to real wage rates – payment received in terms of constant prices per unit time worked -- due to macro shocks is an important factor in determining what the impact of the macro shock was for most people. Second, it is widely presumed to be the real wage rate -- the price per unit time -- that affects time allocations at the margin. Third, it is often thought that, on account of their flexibility, developing-country labor markets adjust to a reduction in aggregate demand (brought about by a recession or crisis) much more through real wage rate reductions than through changes in labor market quantities, such as increases in open unemployment. Indeed, in many cases, wages are thought to fall significantly more than GDP. Such dominance of "price" adjustments, if they in fact do occur, mean that the impacts of shocks are spread more broadly and adjustment may be quicker than if adjustment were primarily through quantities, such as increased unemployment. Fourth and finally, the design of effective anti-poverty and social safety net policies depends on having accurate information about what really happens to real wages due to such shocks.

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[1] See, for example, Arya (1999), Behrman, Deolalikar, Tinakorn and Chandoevwit (2000), Behrman and Tinakorn (2000), Betcherman and Islam (2000), Campbell (1999), Fallon and Lucas (2000), Gray (1998), Horton and Mazumdar (1999), Kakwani (1998, 1999), Kakwani and Pothong (1998, 1999), Kittiprapas (1999), Kittiprapas and Intaravitak (2000), Knowles, Pernia and Racelis (1999), Mahmoud and Aryah(1999), Siamwalla (2000) and World Bank (2000).

In this paper we explore what happened to real wage rates for the particular case of Thailand during the Asian financial crisis. While our empirical analysis is for Thailand, the questions we address are of relevance for other developing countries that experience such macro shocks.

Thailand was the first of the Asian developing economies to experience the financial crisis of the second half of the 1990s. In 1997 speculation on currency devaluation intensified, official foreign reserves were rapidly depleted, the currency subsequently was allowed to float and devalued considerably, and over half of the finance companies were closed. The annual growth rate in real GDP per capita declined to -2.3 percent in 1997 and to -10.4 percent for 1998 from 4.5 percent for 1996 and from an average of 7.2 percent for 1990-95. Real GDP per capita relative to the underlying secular growth trend for the 1990s fell (from the peak in 1996) by 5.2 percent in 1997, 20.2 percent in 1998, and 20.5 percent in 1999.[2] The initiation of the Asian financial crisis that hit a number of countries in the late 1990s is usually denoted to be these events in early and mid 1997 in Thailand.

The Thai unemployment rate for the first quarter (February, Round 1 of the Labor Force Survey, the dry season) was fairly stable for 1995-7 (2.3 percent, 2.0 percent, 2.2 percent) but then more than doubled in 1998 (4.6 percent or 1.48 million people) and further increased in 1999 (5.2 percent or 1.64 million people). The unemployment rate for the third quarter (July, Round 3 of the LFS, the wet season) also was stable or declining for 1995-7 (1.1 percent, 1.1 percent, 0.9 percent), but then more than tripled in 1998 (3.4 percent or 1.13 million people) and further increased in 1999 (5.3 percent or 1.75 million people). The reduction in aggregate demand for labor also resulted in lower wage earnings for workers, and this, in turn, may have induced a number of behavioral responses among Thai workers, such as reduced consumption, lower utilization of higher-cost health and education services and changing consumption and investment patterns more broadly.

Most of the previous literature claims that real wage rates declined a fair amount in Thailand due to the crisis and in various degrees in the other Asian economies most afflicted by the crisis. Section 2 reviews these claims. But, as discussed in Section 3, we demonstrate that real wage rates as estimated by averaging individual real wage rate reports from the LFS did <u>not</u> decline in the immediate post-crisis period relative to the immediate pre-crisis period, despite many previous

[2] The last estimates are based on the data for the 1990s as presented in Behrman and Tinakorn (2000, Table 8). These estimates focus on how much real GDP per capita differs from the secular trend each year, and – because this secular trend is positive – incorporate the secular growth not realized in addition to any decline in measured real GDP per capita. Kakwani and Pothong (1998) construct a similar measure of the macro crisis and estimate it to be -19.2 and -24.8 percent of the pre-crisis secular trend extrapolated into 1998 for the first and third quarters of 1998.

claims that suggest that they did fall. This casts a considerably different light than in most of the previous literature on the extent to which the negative shock on the labor market caused quantity adjustments in employment and hours worked versus price adjustments in wage rates, which may have important implications not only for understanding the recent past but also for anticipating future developments. It also, as noted, may have important effects on understanding the impact of the crisis on income of labor and on time allocation. Section 4 considers possible reasons for the differences between our results and those of others, and concludes that other studies are likely to be misleading because of the confounding of adjustments in hours worked with wage rate changes and, in some cases, because of aggregation problems. Section 5 summarizes what happened to real wage rates for various subgroups of the Thai labor force defined by individual characteristics in order to illuminate further the response of real wage rates to the crisis. This examination highlights the importance of compositional changes in those involved in wage employment. Section 6 concludes.

Section 2. Summary of Previous Literature on Real Wage Declines due to the Crisis

Studies by other authors on the impact of the crisis on Thai labor markets have suggested -- and in most cases stated explicitly -- that wage rates fell considerably in the immediate aftermath of the crisis, though in some cases there is some ambiguity about whether wage rates or wage earnings are being discussed. We begin by summarizing the results of the World Bank (2000) because that is the most recent, probably the most visible, and the clearest on the methodology used among the available studies. We then summarize more briefly five other studies.

Section 2.1 World Bank (2000) Estimates of Thai Real Wage Declines

The World Bank (2000) compares the percentage changes between the averages over three LFS survey rounds in the pre-crisis period (i.e., the first and third quarters of 1996 and the first quarter of 1997) and the averages over three survey rounds after the initiation of the crisis (i.e., the first and third quarters of 1998 and the first quarter of 1999). The crisis effect is then calculated as the percentage difference between the value of an indicator during the initial crisis period and its average value during the pre-crisis period. Both periods cover five quarters, or 1.25 years, ending about six months before and starting about six months after, respectively, the July 1997 date that often is referred to as the start of the crisis period. For comparability, both are for the same duration and both include the same combination of peak and slack LFSs. To avoid long and perhaps awkward terminology, we refer in what follows to these two periods as the pre- and post-crisis periods, though the latter is really post-initiation of the crisis, not post-crisis in the sense of after-the-crisis-concluded. For the World Bank (2000) study, monthly wages were calculated from wages reported for other

reporting periods (e.g., hourly, daily, weekly) by multiplying by standard factors that assume full-time work.[3] Then other monetary benefits were added and the resulting total monthly wage was deflated by the CPI to obtain the total real monthly wage. Based on this wage measure, the World Bank (2000) concludes that "Real wages in Thailand peaked in 1997, and continued to fall throughout 1998 and 1999....[4] The year-on-year declines, however, were not overly large -- roughly of the order of 3.5 percent in the first quarter of 1998, 5.6 percent in the third quarter of 1998, 3.7 percent in the first quarter of 1999, and 0.6 percent in the third quarter of 1999" (p. 8).

Table 1: Percentage Year-on-Year Changes in Employment, Real Wages, Real Wage Earnings and GDP, 1997-8 (percent ratio to percent change in GDP in parentheses)

	Percent change in:			
	Employment	Real Wages	Real Wage Labor Earnings	GDP
Indonesia	2.7	-41.0	-38.3	-13.7
	(-20)	(299)	(280)	
South Korea	-5.3	-9.3	-14.6	-5.8
	(91)	(160)	(252)	
Malaysia	-2.7	-1.1	-3.8	-7.5
	(36)	(15)	(51)	
Thailand	-3.0	-4.6	-7.6	-10.0
	(30)	(46)	(76)	

Source: World Bank (2000, Table 1). Figures for Thailand calculated from Labor Force Survey data, and represent data for the first and third quarters of 1998. Figures for other countries obtained from Betcherman and Islam (2000), and refer to the full 1998 year.

The World Bank (2000) also compares its estimates with estimates from a previous World Bank study of the rates of change of employment, real wages, aggregate real wage labor earnings and GDP for Indonesia, South Korea, and Malaysia by Betcherman and Islam (2000). Table 1 reproduces this comparison. For the periods considered, Thailand had the second largest drop in employment and the third largest drop in aggregate real wage labor earnings. In an absolute sense, thus, by these two measures Thai labor fared near the middle of this group, a little worse than the middle in terms of employment and a little better than the middle in terms of aggregate real wage labor income. But Thailand had the second largest drop in GDP, so relative to the rest of the economy Thai labor fared somewhat better than did labor in most of the other countries. Thai employment fell in percentage

[3] Specifically, hourly wages were multiplied by 208 work hours per month, daily wages were multiplied by 26 days per month, and weekly wages were multiplied by 4.2 weeks per month.

[4] Wages are monthly wages including bonus, overtime and other payments. Real wages are calculated by deflating nominal wages by the region-specific consumer price index. All real wages are expressed in 1999 Baht.

terms only by 0.30 as much as did the GDP, which was somewhat smaller than in Malaysia and much smaller than in Korea. Thai aggregate real wage earnings fell by 0.76 as much in percentage terms as did GDP, which was much smaller than in Indonesia or Korea, though more than in Malaysia.

What about real wage rates? The column for real wages in Table 1 was obtained by subtracting the percentage change in employment from the percentage change in real wage labor earnings. This column indicates that real wages fell by -4.6 percent in Thailand, which is somewhat more than the estimated decline in Malaysia, but much less than the estimated declines in South Korea and particularly in Indonesia.

Section 2.2. Other Studies on Thai Real Wage Rate Declines in Response to the Crisis

We review here more briefly five other studies. While these studies vary in terms of clarity about exactly what was done, they all convey the impression that the empirical evidence suggests that Thai real wage rates declined on the order of magnitude of that suggested by the World Bank (2000) due to the crisis.

1. Kakwani (1998) discusses in careful detail various aspects of separating secular from cyclical from seasonal from random components in examining labor market data and the definitions of the quantitative indicators for labor market outcomes and how they might be adjusted to better reflect the concepts of interest. With regard to the price component, wage rates, however, he only discusses deflation by regional deflators. He presents in Table 6 in his paper data on "wage earnings" that indicate that they fell from 6273 Baht per month in the first quarter of 1997 to 5825 Baht per month in the first quarter of 1998 – a decline of 7.1 percent.

2. Kittiprapas and Intaravitak (2000, Appendix 1) define real monthly wages by translating wages reported for other periods (e.g., hourly, daily, weekly) into monthly wages using: (a) hourly wages* hours worked per week *30/7, (b) daily wages*days of work per week*30/7, and (c) weekly wage*30/7, respectively for the payment periods used in the reports in the LFS. In all cases the monetary value of monthly bonuses plus overtime plus other monetary fringe benefits then were added, and the total deflated by the consumer price index (CPI). Table 2 presents their results. Their calculations suggest significant declines of 4.6 percent and 3.9 percent in real wage earnings for Rounds 1 and 3, respectively, of the LFS in 1998 as compared with 1997.

Table 2. Real Average Monthly Wage Earnings (Baht) and Percentage Changes over Past Year									
Dry Season (Labor Force Survey Round 1)					Wet Season (Labor Force Survey Round 3)				
Feb-95	Feb-96	Feb-97	Feb-98	Feb-99	Aug-95	Aug-96	Aug-97	Aug-98	Aug-99
4,964	5,220	5.503	5.249	5,292	5,728	5,688	5,950	5,720	5,564
-0.2%	5.2%	5.4%	-4.6%	0.8%	4.8%	-0.7%	4.6%	-3.9%	-2.7%
Source: Kittiprapas and Intraravitak (2000, Table 12, p. 27) based on Labor Force Survey, NSO.									

3. Mahmood and Aryah (1999): "Real wages have followed the pre crisis tightening of the labour market, and the crisis slack.... [R]eal wage growth [was] over 2 percent in 1996. The crisis lowered real wage growth in 1997 to 1 percent, and then cut the real wage by over 7 percent in 1998. The cut in the real wage is expected to persist over 1999" (p. 4)....Unemployment and underemployment will also underestimate the impact of the crisis, because at low levels of income, workers will offer their labour at lower wage rates rather than unemployment and a complete loss of income. Again Labour Force data shows that between February 1997 and February 1998, the nominal wage dropped by 6 percent, while the real wage rate dropped by 4 percent" (p. 16).[5] We note that it is not clear whether the first statement refers to wage earnings or wage rates, but the second explicitly refers to wage rates.

4. Pongsapich and Brimble (1999, Section 3.2): "Wages fell back to near 1996 levels. The total nominal wage bill in the private sector in 1998 was about 1 1/4 billion baht lower than in 1997, falling back to little more than the levels of 1996. The loss of real income per income earner reached 21 percent by the wet season of 1998, declining further from the fall of 17 percent in the previous dry season."

5. Siamwalla (2000): "[N]ominal wages among the males in the educated group fell by about 6-8 percent between August 1997 and August 1998, and among females by about 4-7 percent. Among the less educated, the fall was less than 2 percent" (p. 27). The fall in real wages, of course, would be almost 8 percent greater (given the 7.8 percent increase in the CPI between 1997 and 1998).

[5] The source is given as ILO, 1999, "Country Employment Policy Review for Thailand." Given that inflation was positive (5.6 percent in 1997 and 8.1 percent in 1998 according to the CPI based on data from the Bank of Thailand, see Behrman, Deolalikar, Tinakorn and Chandoevwit 2000, Table 2), it is not clear how the real drop in percentage terms can be less than, rather than greater than, the nominal drop in percentage terms.

Section 3. What Averaging Individual Wage Rate Data from Labor Force Surveys Implies Regarding Real Wage Rate Movements

We focus on the real hourly wage compensation rate. We use the term "wage compensation" to reflect that our measure includes wage payments plus the monetary value of other benefits per hour worked translated into real terms using the regional consumer price index (CPI), which is parallel to the approach for wage earnings in World Bank (2000) and in Kittiprapas and Intraravitak (2000). We use the term "hourly ... rate" to reflect that this is measured per hour reported worked in the past week (with the added assumption for those who reported wages on a monthly basis that the week prior to the survey was randomly selected among the four plus weeks in the past month across workers). This gives the pure price effect. In contrast almost all studies by other authors have referred to monthly wages but have confounded changes in hours worked with changes in wage rates per hour (see Section 2 and 4) and have not constructed a separate hourly wage rate variable by averaging the data on an individual level. As we discuss below, these are not innocuous choices, but result in a considerably different understanding of what happened to wage rates before and after the initiation of the crisis and to what extent there were price versus quantity adjustments.

We follow World Bank (2000) and compare the percentage changes between the averages over three LFS survey rounds in the pre-crisis period (i.e., the first and third quarters of 1996 and the first quarter of 1997) and the averages over three survey rounds after the initiation of the crisis (i.e., the first and third quarters of 1998 and the first quarter of 1999). The crisis effect again is calculated as the percentage difference between the value of an indicator during the initial crisis period and its average value during the pre-crisis period.[6] Table 3 gives our estimates of the percentage change in real hourly wage compensation, as well as of some other major aggregate labor market variables. For all but the real hourly wage compensation, the percentage changes are similar to those reported in World Bank (2000) (though that study does not include hours worked).

Our result for the real hourly wage compensation rate is striking. We find that the post-crisis period value of this rate exceeded the pre-crisis period value of this rate by 2 percent. This contrasts sharply with previous suggestions that are summarized in Section 2 that real wage rate declines were an important aspect of the adjustment process. Figure 1 plots the real hourly wage rate over the 1987-

[6] Again, both periods cover five quarters, or 1.25 years, ending about six months before and starting about six months after, respectively the July 1997 date that often is referred to as the start of the crisis period. For comparability, once again, both are for the same duration and both include the same combination of peak and slack LFSs.

2000 period for which we have comparable data. Generally this figure suggests a secular upward trend in real wage rates that continued after the crisis and that is consistent with an increase in the reported real wage rate after the initiation of the crisis, with the exception of a blip in the third quarter of 1997 (the first quarter after the usual dating of the start of the financial crisis).[7] For the three included survey periods subsequent to this blip, the real hourly compensation rate was decreasing,[8] but the average over these three periods exceeded the average over comparable periods before the blip, which is the result presented in Table 3.

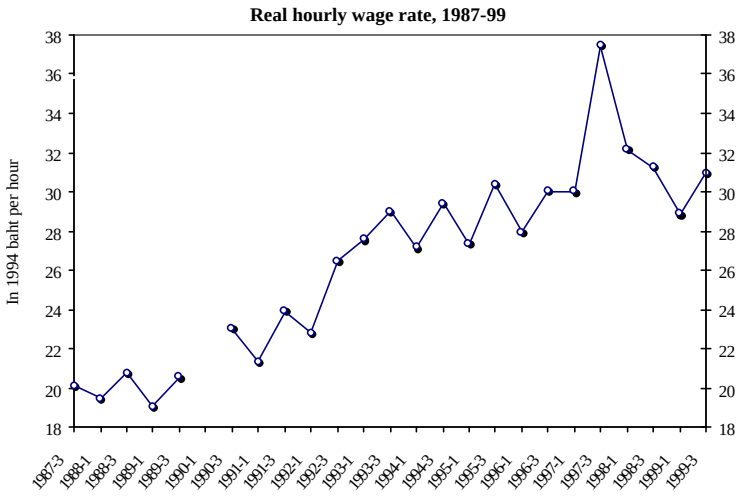

Figure 1
Note: No first round survey was conducted by the NSO in 1990 since it was a population census year.

In summary, though the real hourly wage compensation rate was declining within our post-crisis period, the average for our post-crisis period exceeds that for the pre-crisis period. From comparing the average real hourly wage compensation rates between the pre- and post crisis periods alone it would not seem possible to conclude that downward real wage rate adjustments on the average between the two periods played an important role in the labor market adjustment process. Though within the post-crisis period price adjustments apparently may have begun to take place, labor market quantity adjustments seem to have dominated exclusively on the average between the pre- and the post-crisis period. The relatively great wage rate rigidity revealed by our calculations from the Thai LFSs, in fact, may be a puzzle, in part because factors that often are alleged to cause wage rigidity in other labor markets do not seem very important in the Thai case (e.g., minimum wages, severance pay, unionization -- see Behrman, Deolalikar, Tinakorn and Chandoevwit 2000, Section 4).

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[7] The 1997 third quarter real wage rate was strikingly high -- 23.5 percent above the post-crisis average and 38.2 percent above the pre-crisis average. It should be emphasized, however, that if there is some anomaly for the 1997 third quarter report, that does not affect our – and nor the World Bank's (2000) – pre-post comparisons because that period is not used for these comparisons.

[8] The real wage rates declined between rounds within the post-crisis period: by 14.1 percent from 1997-3 to 1998-1, by 2.8 percent from 1998-1 to 1998-3, and by 7.7 percent from 1998-3 to 1999-1.

Table 3. Percentage Changes in Labor Market Indicators Before and After July 1997[a]	
Labor Force	1.9%
Total Employment[b]	-1.0%
Wage Employment[b]	-5.5%
Total Hours Worked[b]	-3.4%
Wage Hours Worked[b]	-5.4%
Unemployed	158%
Underemployed[c]	239%
Real Hourly Wage Compensation[d]	*2.0%*
Real Average Monthly Wage Earnings[e]	-2.5%

[a] Calculations from the LFS data tapes. Changes are defined between the period prior to the crisis (first quarter of 1996, third quarter of 1996, first quarter of 1997) to a comparable period after the initiation of the crises (first quarter of 1998, third quarter of 1998, first quarter of 1999).
[b] "Total" (employment, hours worked) includes wage recipients in private and public sector plus self-employed plus unpaid family workers. "Wage" (employment, hours worked) includes only wage recipients.
[c] "Underemployed" is defined to be those working less than 20 hours per week.
[d] Real hourly wage compensation includes cash wages plus monetary benefits, adjusted for the CPI, per hour worked.
[e] Real average monthly wage earnings are the product of real hourly wage compensation times hours worked per month (assuming that the hours worked in the previous week also were on average the hours worked per week for the previous month).

Section 4. Why the Difference?

The difference between the estimates reported in Sections 2 and 3 is striking – the difference between about a 5 percent decline in real wage rates versus an increase of about 2 percent. What one thinks about the impact of the Thai crisis on real wage rates, to what extent labor market adjustments occurred through price adjustments, the role of wage rate changes in altering income distribution, and the role of real wage rates in affecting time allocation all would differ substantially depending on which of these percentage changes best approximates empirical reality. We now consider several possible explanations for the difference.

Section 4.1 Measurement Errors in Hours Worked

Our measure of real wage rates, as noted, combines data on payments for different time periods (e.g., hourly, daily, weekly, monthly) by using the reported hours worked per week to translate the earnings reported for other than hourly periods into hourly rates. Some think that measurement errors in hours worked are relatively large. Might measurement errors in hours worked mean that what

really was a decline in real wage rates appears to be an increase? In response to this question we have several comments. First, we are not aware of any systematic evidence that demonstrates that measurement errors are larger in hours worked than in earnings. Second, if measurement errors in hours worked are random with respect to earnings, they do not affect the averages that we are reporting. Third, if there are systematic errors in reported hours worked, the most likely error would seem to be an overreporting of recent hours worked after the initiation of the crisis because people adjusted their recollections of hours worked slowly and, thus, did not fully incorporate recent drops in hours worked in their response to the survey question. But systematic over-reporting of recent hours worked after the initiation of the crisis would result in downward biased estimates of real wage rates, not upward biased estimates. Fourth, the one category of reported earnings that is not adjusted for reported hours worked, of course, is the one for people who directly reported hourly wage rates. Figure 2 graphs the hourly wage rates for those individuals who directly reported hourly wages. This figure suggests greater variations in real hourly wage rates starting in 1997 than earlier in the 1990s (but not more than in the late 1980s), but not a clear pattern of declining real wage rates subsequent to the start of the crisis. Even though there is a decline from the third quarter of 1997 to the third quarter of 1998, there is an increase between the third quarter of 1998 and 1999 (and then a drop to the first quarter of 2000). The average for the three reports after the third quarter of 1997 is about the same as the average for the last three reports before the third quarter of 1997. The average for the four reports after the third quarter of 1997 is about the same as the average for the last four reports before the third quarter of 1997.

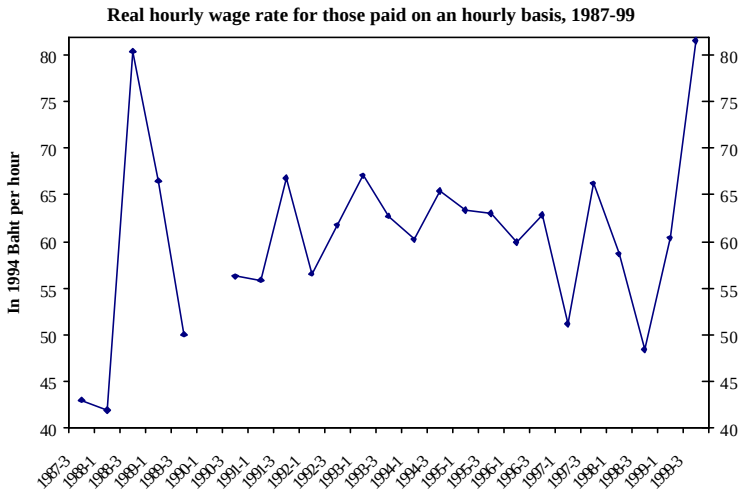

Figure 2

Thus, we conclude that measurement errors in hours worked are not likely to result in the estimates in Section 3 being substantially misleading.

Section 4.2 Confounding of Changes in Wage Rates with Adjustments in Hours Worked

For all of the studies reviewed in Section 2 for which the methods are clear (and probably for the others as well) adjustments in hours worked are included in the measures of real wage rate changes used. For workers who always are working full time, for example, the procedure used in the World Bank (2000) yields real wage earnings, and changes in this measure originate only from changes in real wage rates per unit of time actually worked. But for other workers, this measure confounds effects of wage rates and hours worked. The estimates in Table 1 also do not adjust for hours worked, even though hours worked changed substantially in Thailand and quite possibly in other countries. The Kittiprapas and Intaravitak (2000) measure of monthly real wages, for another example, definitely includes the impact of changing wages per hour and changing hours of work for all but the workers who directly report hourly wage rates.

The confounding of changes in the time worked with changes in the real wage rate per unit time does not permit a clean identification of the wage rate per unit time or price of labor. Given that hours worked per wage worker declined substantially – by 5.4 percent – in the post- as compared with the pre-crisis period (Table 3), the result of this confounding is to understate algebraically (i.e., make it appear more negative than it was in fact) the comparison of the post- with the pre-crisis real wage. The confusion between changes in hours worked and changes in real wage rates per unit time is the major factor underlying the much lower algebraically (i.e., more negative) estimates of the post- versus pre-crisis wage rates in most (probably all) of the studies that are summarized in Section 2 in comparison with our estimates in Section 3.

Section 4.3 Aggregation Issues

There is a further issue for the estimates of the percentage changes in real wages in Betcherman and Islam (2000) and World Bank (2000) that are summarized in Table 1. The estimates of real wages in this table are <u>not</u> average real hourly wage rates obtained from averaging such rates for individual wage rates. Instead they are calculated by subtracting from the rate of change of real wage labor earnings the rate of change in employment. This does <u>not</u> yield the change in the real wage rate that would be obtained by working with the average real wage rate obtained by averaging over wage workers, as can be seen from considering the definitions of the underlying variables. In the illustration below, hours worked are assumed to vary across individuals because this is the simplest case in

which to illustrate the aggregation issue, but the same point holds if employment varies (which is just a variation from zero hours worked to full-time work).[9]

The wage earnings of each individual i in period t (E_{it}) is the product of that individual's hourly wage rate in period t (W_{it}) and that individual's hours worked in period t (H_{it}):

(1) $E_{it} = W_{it}*H_{it}$.

Therefore over time the rate of change for the earnings of that individual is:

(2) $dE_{it}/E_{it} = dW_{it}/W_{it} + dH_{it}/H_{it}$.

So, on an individual level, the rate of change of the wage rate equals the rate of change of wage earnings minus the rate of change of hours worked. This apparently is the intuition behind the procedure used in Betcherman and Islam (2000) and World Bank (2000) to obtain the estimates for the rate of changes of wage rates in Table 1.

The mean wage earnings in period t (E_{mt}), the mean hourly wage rate in period t (W_{mt}), and the mean hours worked per in period t (H_{mt}) are:

(3) $E_{mt} = \Sigma E_{it}/n_t$,

(4) $W_{mt} = \Sigma W_{it}/n_t$, and

(5) $H_{mt} = \Sigma H_{it}/n_t$,

where the sums are over the n_t workers who earn positive wages in period t. Note that mean earnings in period t does <u>not</u> equal mean wage rates in period t times mean hours worked in period t:

(6) $E_{mt} \ldots W_{mt}*H_{mt}$.

[9] If all workers work full time and the only question is one of whether an individual works full-time or not at all (i.e., is employed), the variable H in what follows is a latent variable for desired hours worked but "employment" depends on that latent variable and takes on the values of zero or one.

This can be seen by substituting (4) and (5) into the right side of (6) and noting that the product includes cross-product terms between wage rates for one worker and hours worked for other workers in addition to the own-worker product terms that enter into $E_{mt} = \Sigma E_{it}/n_t = \Sigma (W_{it}*H_{it})/n_t$. Therefore the rate of growth in mean earnings does <u>not</u> equal the sum of the rate of growth in mean wages plus the sum of the rate of growth in mean hours worked.

(7) $dE_{mt}/E_{mt} \ldots dW_{mt}/W_{mt} + dH_{mt}/H_{mt}$.

Thus, though relation (2) holds for individuals, relation (7) -- which is analogous to what is assumed in the studies underlying the estimates in Table 1 -- is <u>not</u> an equality for the means.[10]

The inequality in relation (7) can be illustrated with the information in Table 3 -- the percentage change in real wage earnings (-2.5 percent) does <u>not</u> equal the percentage change in real hourly wage rates (4.8 percent) plus the percentage change in hours worked by wage employees (-5.4 percent) because of the cross-product terms that arise in aggregation. The influence of these cross-product terms would have to be added to the right-side of relation (7) to make it an equality, and this influence effectively is negative because of the tendency for wage hours worked to have fallen though measured real wage rates tended to rise.

Thus, the studies summarized in Table 1 do not really present changes in wage rates (but just the residual defined on an aggregate level by subtracting the percentage change in employment from the percentage change in real wage earnings). Therefore, they cannot be used to judge whether wage rate ("price") or quantity changes were more important across countries, nor to compare changes in real wage rates across countries, nor to access the impact of real wage rate changes on income distribution, purchasing power and time allocation – even though they have been interpreted to be useful for all of these purposes.

[10] Note that this is the result of using arithmetic averages. Were geometric averages used, relations (6) and (7) would hold with equalities. But the convention is widely established, including in all the previous studies of Thai labor markets, of using arithmetic averages, so such averages are what we consider here.

Section 5. Real Wage Changes for Subgroups and Compositional Changes in Wage Employment

Why would mean real wage rates be higher in the immediate post-crisis period than in the immediate pre-crisis period despite the many claims to the contrary in studies such as are summarized in Section 2? To answer this question, a distinction needs to be made between mean wage rates and wage rates for given individuals. To the extent that the composition of wage earners may have changed during the crisis, a comparison of mean wage rates before and after the crisis is really a comparison of wage rates for different sets of workers. As is suggested by Table 3, one effect of the crisis was that it moved some workers from employed to unemployed status, and significantly more workers from wage to nonwage employment. It is possible, and even likely, that the workers who left wage employment status tended to receive lower wages than others prior to leaving wage employment because they were less productive regarding observed characteristics such as schooling or unobserved characteristics such as innate ability and motivation. If so, it is possible that mean wage rates for those in wage employment in the post-crisis period increased, even though the post-crisis wage rates for those who maintained wage employment through both periods hardly changed or even declined.

In this section we explore such possibilities by seeing to what extent there was selective departure from wage employment by the characteristics observed in the data, though of course we are not able to explore possible selectivity in leaving wage employment with regard to characteristics that are unobserved in the data such as ability and motivation (owing to the non-availability of longitudinal data). Table 4 summarizes relevant data for all workers and for subcategories defined by three characteristics of workers that are observed in the data and that are not likely to change (or at least not change much) due to labor market conditions: gender, age, and schooling.[11] The first two columns include the average wage rate for the indicated subgroup as a percentage of the national average wage rate for both the pre-crisis and the post-crisis periods. These data permit the characterization of which types of workers received relatively high wage rates. The next four columns include the percentage changes between the pre- and the post-crisis periods for wage employment, hours worked in wage employment, the real hourly wage compensation and the real average monthly wage earnings for the indicated subgroup.

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[11] Schooling may be affected a little by labor market conditions for those near the margin of ending their schooling, but not much for older individuals in the prime working age ranges. We do not include in this table characteristics such as location, migration status, work status, and occupation because these are likely to be affected by labor market conditions.

Table 4. Wages as Percentages of National Average Wages in Pre- and Post-Crisis Periods and Percentage Changes in Selected Labor Market Indicators Before and After July 1997 for Selected Subgroups of Workers[a]

Subgroups of Workers	Wage Rate as % of National Average Wage Rate		Percentage Change between Pre- and Post Crisis in:			
	Pre-Crisis	Post-Crisis	Wage Employment	Hours Worked in Wage Employment	Real Hourly Wage Compensation	Real Average Monthly Wage Earnings
All workers	100	100	-5.5	-5.4	4.8	-2.5
By gender						
Female	92.0	92.1	-13.5	-5.4	1.2	-1.9
Male	105.3	105.8	-4.0	-5.4	3.8	-2.3
By age						
15-19 year olds	47.6	44.0	-29.1	-4.6	-4.6	-10.3
20-24 year olds	66.8	61.4	-14.2	-4.9	-3.7	-10.8
25-49 year olds	110.2	105.8	-0.6	-5.4	0.0	-5.8
50+ year olds	139.0	157.9	-0.4	-5.4	12.8	11.6
By schooling						
Less than Primary	43.7	38.8	-22.5	-5.6	-5.8	-12.1
Primary	59.3	55.2	-17.4	-5.2	-4.7	-9.7
Secondary	99.5	89.2	14.8	-4.0	-9.5	-12.3
Vocational	149.4	141.1	1.3	-3.0	-4.6	-7.5
University	255.9	228.7	20.0	-1.8	-11.5	-9.9

[a] See notes to Table 3.

Examination of this table suggests that the increase in the total real wage rate observed in the post- relative to the pre-crisis period is in substantial part the result of compositional changes in wage employment. Wage employment shifted relatively from females to males, from younger to older workers, and from lower-schooled to higher-schooled individuals. Each of these three shifts was from lower to higher wage rate categories. There was a further shift in average hours worked per worker in wage employment by schooling levels that reinforces this tendency, but no such shift in hours worked per wage worker by gender and a small partially offsetting shift in hours worked per wage worker by age groups. For some of these higher wage rate categories – particularly for 50+ year olds and less so for males – real hourly wage compensation increased on average. But even in cases in which it did not, such as for secondary and university education, the compositional shift from much lower wage rate categories to higher wage rate categories meant that the overall average wage rate increased.

These findings are further reinforced by Table 5, which reports mean percentage changes in hourly wage rates between the pre- and post-crisis periods for 30 different subgroups of wage

employees (stratified by age, gender and schooling). In general, the largest real hourly wage declines (of 17-22 percent) were suffered by males aged 20-24 with university education and females aged 20-24 with vocational and technical training (including teacher training). Secondary-educated females aged 20-24 and university-educated males aged 25-49 also suffered relatively large real wage declines (of about 13 percent).

Table 5: Mean percentage changes in real hourly wages rates between pre- and post-crisis periods, by age, sex and schooling levels

	Males aged:				Females aged:			
Completed schooling	15-19	20-24	25-49	50+	15-19	20-24	25-49	50+
Less than primary	.	.	-6.5	-3.2	.	.	-10.7	-1.3
Primary	-8.7	-9.0	-6.8	-3.2	-0.7	-6.2	-2.3	3.5
Secondary	-8.3	-6.2	-11.9	-7.5	-13.9	-13.7	-7.4	-22.3
Vocational	.	-10.7	-8.2	.	.	-17.4	-5.8	4.6
University	.	-21.7	-13.2	-3.7	.	-11.9	-11.4	.

Note: . implies insufficient number of observations to compute a reliable mean statistic.

Next, we estimate a real hourly ln wage equation, pooling individual data from all six quarters covering the pre- and post-crisis periods. All coefficients of the wage equation are allowed to vary across the pre- and post-crisis periods. Using this equation, the actual change in real hourly ln wages (which would be the percentage change in real hourly wages between the pre- and post-crisis periods) can be decomposed into changes that might have occurred in the absence of any compositional changes in wage employment and changes that occurred because of compositional shifts. The estimates of the ln wage equation are presented in Appendix Table A-1, while the results of the decomposition analysis are shown below in Table 6.

The ln wage regression (Table A-1, equation 2) suggests that, controlling for individual characteristics, real hourly wage rates dropped by nearly 15 percent in the aftermath of the financial crisis. The gender gap in wages, which was approximately 21 percent before the crisis, shrank slightly – to 18 percent – in the immediate post-crisis period. The crisis also was associated with a small decline in the wage premium for university education and a large increase in the wage premium for age seniority (especially for ages beyond 50 years). The reasons for these structural shifts in the ln wage equation are unclear.

Table 6: Decomposition of crisis-induced change in real hourly ln wages				
	Slope coefficients varying between pre- and post-crisis periods		Constant slope coefficients model	
	Value	% contribution	Value	% contribution
Changes due to varying coefficients (or wage returns)				
Intercept	-0.133	-701.2	-0.078	-412.3
Female	0.013	66.4		
Primary schooling	0	0		
Secondary schooling	0	0		
Vocational training	0	0		
University education	-0.011	-56.1		
Ages 20-24	0	0		
Ages 24-49	0.037	196.2		
Ages 50 & over	0.016	83.9		
Subtotal	**-0.078**	**-410.8**		
Changes due to shifts in wage employment				
Female	-0.005		-0.004	-23.4
Primary schooling	-0.027	-142.8	-0.027	-143.9
Secondary schooling	0.031	163.6	0.031	164.1
Vocational training	0.004	19.4	0.004	19.4
University education	0.082	431.5	0.080	425.3
Ages 20-24	-0.002	-11.7	-0.002	-11.5
Ages 24-49	0.012	64.4	0.013	68.9
Ages 50 & over	0.002	11.5	0.003	13.3
Subtotal	**0.097**	**510.8**		
Total explained change in ln wages	**0.019**	**100.0**	**0.019**	**100.0**
Notes: See Appendix Table A-1 for the estimates of the underlying ln wage equation.				

The decomposition analysis (Table 6) suggests that, had there been no compositional shifts in wage employment, real hourly wage rates would have declined by 7.8 percent between the pre- and immediate post-crisis periods. Most of this decline would have been the result of a downward shift in the wage function partially offset by increases in the returns to experience (age) and being female.

On the other hand, had real wage rates for every population subgroup remained unchanged during the crisis, the observed *average* wage rate would still have shown an increase of 9.7 percent. Most of this increase (8.2 out of 9.7, or 85 percent) would have occurred because of a shift in wage employment from lower-schooled to university-educated individuals (who typically earn substantially more).

Section 6. Conclusions

What happens to real wage rates at times of macro shocks is of considerable importance because of (a) the implications for purchasing power of workers and the design of appropriate anti-poverty and social safety net policies, (b) the impact on time allocations of workers, and (c) the implications for the extent to which labor market adjustments in response to the shock occur through price rather than quantity effects, which in turn is likely to affect how broadly are the effects spread and how quickly adjustment occurs. Conventional wisdom is that real wage rates fell, in some cases substantially, in Thailand and in the other Asian economies most hit by the financial crisis of the late 1990s, as well as in response to many other negative macro shocks experienced in developing countries.

However the methods widely used to estimate the declines in real wage rates are likely to be biased because of confounding effects of hours worked and, for some studies, aggregation biases. We demonstrate that, for the case of Thailand, these problems result in estimates of declines in average real wage rates of about 5 percent, in sharp contrast to the increase of 2 percent if such wage rates are calculated directly through averaging hourly wage rates over all wage workers. The usual methods, thus, give a misleading picture of what happened to average real wage rates. These methods do not provide good guides regarding the impact of real wage changes on purchasing power or time allocations of workers, nor of the extent of price adjustments in labor markets.

But the estimate that average real wage rates increased by 2 percent in the post- as opposed to the pre-crisis period based on direct aggregation of individual wage rates also is surprising. Consideration of subgroups defined by the fixed individual characteristics available in the Thai Labor Force Surveys suggests that this increase in the average real wage rate reflects compositional changes in wage employment toward males, toward older adults, and toward those with secondary or university schooling – all of whom had relatively high real wage rates both prior to and subsequent to the crisis. This means that, in fact, real wage rates for many or even most individuals who maintained wage employment both before and after the crisis may have declined even though the average real wage rate increased. There is support for this observation in wage functions that are estimated with individual data before and after the crisis. Estimates of such wage functions suggest that, had there been no compositional shifts in wage employment, real hourly wage rates would have declined by about 8 percent between the pre- and immediate post-crisis periods.

Of course, given the importance of characteristics that are not observed in most labor force surveys, it is not possible to be sure what is happening to wage rates facing individuals with fixed

characteristics, unobserved as well as observed, from a time series of cross-sectional surveys. If there is selectivity in wage employment changes with respect to unobserved characteristics, such as ability and motivation, what really is happening to real wage rates simply cannot be inferred from a time series of cross sections. What are needed are panel data that follow the same individuals over time. Statistical agencies should be encouraged to collect such data. Though they are not collected in Thailand, in some countries such as Brazil, labor force surveys are based on rolling panels, which would permit better exploration of the question of concern for this paper.

But in the absence of such data, which is the case for the most part for the Asian countries hit hardest by the crisis,[12] care should be taken to not make misleading inferences about what happened to real wage rates by confounding change in hours worked with changes in wage rates per hour, by aggregation biases, and by ignoring compositional changes in wage employment. The best that can be done probably is to compare wage rates for subgroups disaggregated by the characteristics observed in the data, such as gender, age and schooling. But recognition should be given to the fact that, on the basis of currently available data, it is not possible to provide a definitive answer to the question posed in the title of this paper.

[12] The Indonesian Family Life Survey is an exception in that it is a large household survey based on panel data set that extends both before and after the crisis (see, e.g., Thomas, Frankenberg and Smith 1999; Thomas, Frankenberg, Beegle and Teruel 1999).

Table A-1: Estimated real hourly ln wage functions, using pooled data for six quarters (1Q96, 3Q96, 1Q97, 1Q98, 3Q98 and 1Q99)

	Equation 1		*Equation 2*		*Equation 3*		*Sample Means*	
Independent Variable	*Parameter*	*T-ratio*	*Parameter*	*T-ratio*	*Parameter*	*T-ratio*	*Pre-crisis*	*Post-crisis*
Whether female	-0.193	-45.2	-0.208	-34.6	-0.208	-9.7	0.398	0.421
Whether primary schooled	0.348	36.6	0.334	24.5	0.346	31.5	0.585	0.507
Whether secondary schooled	0.822	78.8	0.820	54.9	0.821	87.6	0.172	0.210
Whether having vocational/technical training	1.229	92.9	1.215	66.6	1.226	114.5	0.044	0.047
Whether having university education	1.740	168.2	1.758	118.4	1.768	156.3	0.148	0.194
Whether aged 20-24 years	0.133	15.9	0.139	12.4	0.135	5.5	0.178	0.162
Whether aged 24-49 years	0.374	50.3	0.354	36.2	0.350	12.6	0.642	0.677
Whether aged 50 years and over	0.571	47.7	0.498	30.1	0.495	15.3	0.095	0.099
Dummy for post-crisis period	-0.078	-18.6	-0.146	-6.2	-0.133	-5.9	0	1
Crisis x Female			0.030	3.5	0.030	1.9		
Crisis x Primary schooling			0.027	1.4				
Crisis x Secondary schooling			0.006	0.3				
Crisis x Vocational education			0.025	1.0				
Crisis x University education			-0.033	-1.7	-0.055	-8.5		
Crisis x 20-24 years			-0.010	-0.6				
Crisis x 24-49 years			0.046	3.1	0.055	9.6		
Crisis x 50 years and over			0.153	6.4	0.161	17.7		
Intercept	2.372	198.6	2.403	144.7	2.397	316.1		
Mean of dependent variable							3.269	3.289
R-square	0.505		0.506		0.506			
F-statistic	8,179		4,371		17,570			
Number of observations	223,484		223,484		223,484			

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