

# Migration vs Agricultural Protection for Reducing Rural Poverty: the case of Indonesia

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# Introduction

- Focus of paper: agricultural labour markets and the alleviation of (rural) poverty
- Rural regions have the lowest incomes in virtually all countries and the poorest people have only their labour to sell to earn income
- So labour market focus is critical to deal with poverty reduction, particularly agricultural or rural labour markets
- And poverty will be reduced by raising those agricultural wage rates
- But there are many policy tools that can change agricultural wage rates
- Two that we will explore here are trade protection for agricultural products and a labour market option, open migration from rural to urban areas
  - We use data from Indonesia, due to its high levels of migration

# Introduction 2

- These tools are both used or observed widely in Indonesia
- Rice policy, like most food crops, is protected with trade restrictions and is on an import basis
- These policies are adopted with strong rhetoric about how they are important in reducing rural poverty
- But migration, rural to urban for the most part, is also substantial, and is known as an important element of human capital formation and source of increased income
- So we will examine the relative merits of these two tools in reducing poverty through raising wage rates

# Introduction 3

- In analyzing rural labour markets, we would like to know how they operate
  - What determines wage rates, particularly agricultural wages
  - Are agricultural labour markets independent of urban labour markets?
    - For example, does the agricultural wage respond to urban/industrial demand variables, or only agricultural variables such as rice prices, or to both types?
  - They imply different poverty reduction strategies
    - Specifically, should governments use rice prices to reduce rural poverty, as many claim to do
    - Or should they rely on non-farm economic growth, including off-farm employment as the best way to lower poverty?

# Implications for Poverty Policy

- If agricultural wage rates are heavily determined by rice prices, other output prices, farm input prices, agricultural research, then using policy to change these variables would be an effective way to raise wages and reduce poverty
- If agricultural wage rates are heavily determined by non-farm factors, such as the manufacturing wage rate, the urban unemployment rate, the nonfarm GDP growth rate, then the best anti-poverty policy would be to ensure an open (rural to urban) migration policy, as well as strong nonfarm economic growth, and good “rural infrastructure” (e.g., transportation, rural education) to facilitate such movement

# Historical Context: Dualism in Labour Mkts

- This analysis also speaks to a quite old debate in the literature on economic development
- It concerns “dualism” in developing country labour markets
- As far back as Ricardo, but more recently (1950s) via Nobel Laureate Arthur Lewis, many development economists fond of arguing in support of labour market dualism
- According to this theory, the agricultural labour market was quite independent of, and different from, urban or industrial labour markets
  - Agricultural wages were *not competitively determined* but rather were determined by “bargaining” around a subsistence wage, affected by the price of food
  - The supply of labor was largely flat (due to “surplus labour”)
  - Some migration due to higher industrial sector wage but no wage rate convergence

# Is a Lewis view of Indonesia plausible?

- My first observations of agric. labour mkts in Indonesia in 1985-86 were in stark contrast to the Lewis model, which led me to this research (wage convergence)
- One factor that made this widely-used argument so questionable in an Indonesian context was the very high degree of rural to urban migration
- And it was coupled with a diminished (now-modest) proportion of the population engaged in rice farming
- Under these conditions it was plausible that urban wage rates not only attracted labour from agriculture, but even “set” those agricultural wage rates (i.e., that the agricultural sector was a price-taker in the labor market)
- This may not seem unusual for rich countries but it appears “early” for developing country like Indonesia in 1980s
  - i.e., it would be expected to occur later, at much higher average incomes

# Our Research Approach, Implications

- We tested several of these statements in context of Indonesian labour markets to see if they applied, focusing on the three provinces of Java
- Is the farm labor market affected only by farm factors, such as rice prices, or do urban wage rates explain agricultural wage rates?
- How large are their respective effects on agricultural wages?
- This has important policy implications as noted earlier
  - If we find that rice prices have a significant effect on agricultural wage rates, higher rice prices would reduce rural poverty of net rice sellers (farmers), offsetting the increased cost of rice to net rice consumers
  - If we find rice prices have little effect on agricultural wage rates, then Indonesia's raised rice prices will not have boosted wage rates and will have no anti-poverty effect for farmers (and will have increased poverty for all poor rice consumers)
  - Rather, this policy will have primarily raised *rice land* prices, the only likely input market whose prices will rise with greater rice output
  - Very different distributional outcomes of a major policy measure



# Are Indonesian labour markets unique?

- No recent history (since at least WWII) of migration restrictions
- Rural labor has moderate skill levels, enough education to compete for unskilled jobs in urban market (literacy +)
- V. high observed migration flows, mostly rural to urban except during recessions or for failed individual migrants
- Agricultural share of GDP has fallen to 15% (by 2010)
- Heavy involvement of farm family labour in off-farm employment
- Many observations of farm workers with village (non-agric) jobs, rural village workers migrating to regional towns, onward to large cities (e.g., R. Naylor, “The Rural Labor Market in Indonesia,” in W. Falcon *et al*, *Rice Policy in Indonesia*, 1991)
  - Aided by high population density (especially in Java)
- These factors lower costs and raise benefits from migration, somewhat unique in degree among low-middle income DCs

# Research Procedure

- We constructed a model of rural wage rates that incorporates factors that increase the demand for rural farm labour; both agricultural and urban variables
- It is a simple model but focuses on three key questions:
  - Do agricultural factors affect farm wage rates?
  - Do urban or mftg sector variables affect farm wage rates?
  - How do their effects differ in size?
- Use formal time series econometrics procedures
  - These formal procedures *required* a simple model
- Time series data of acceptable length, > 25 years; our data runs 1983-2009 with quarterly observations
  - Focus on West, Central and East Java only, for reasons of data availability; these regions also most likely to show agricultural and urban labor market integration (debatable; Outer Islands workers have stronger incentives to migrate due to larger wage gap)

# Data

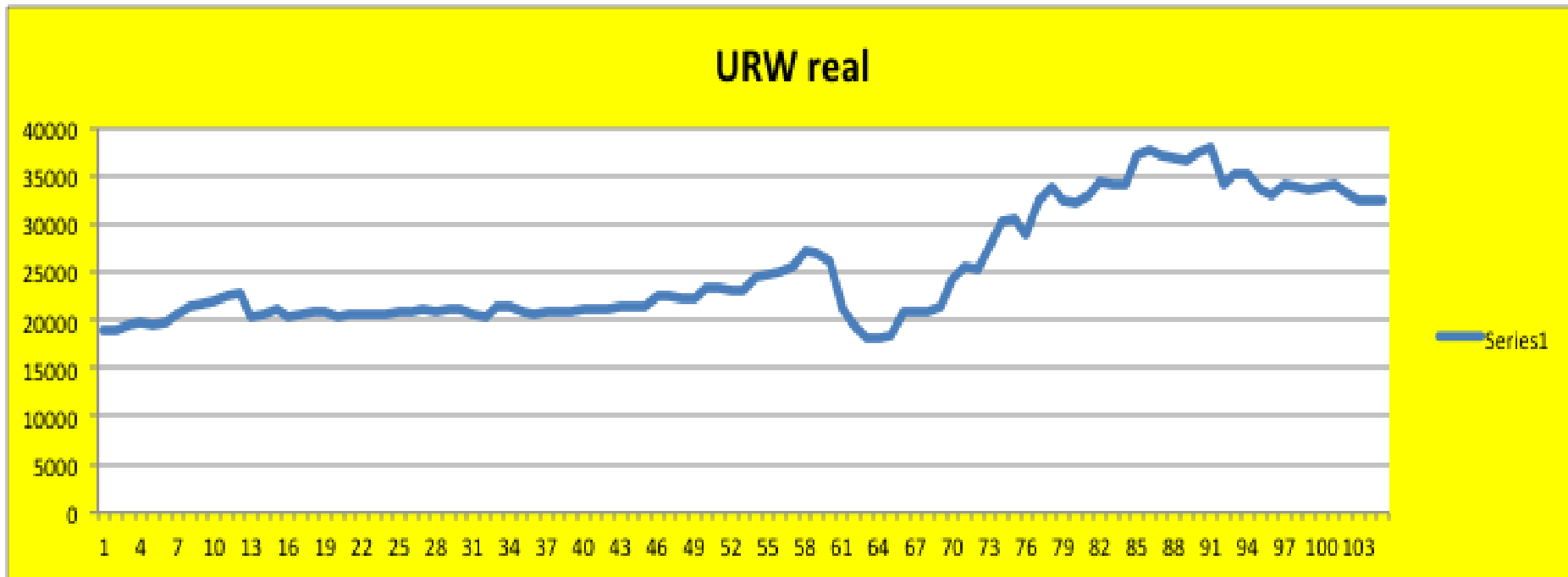
- Source: BPS (the Indonesian Central Bureau of Statistics).
- 108 quarterly observations from 1983 to 2009.
- Province-level agricultural wage rates are used as a proxy for *RUW=Rural Wage*: West Java, Central Java, East Java (covers 70% of Indonesian population or 170 mill)  
Real wage deflator: Rural CPI – 2007 base year.
- Country-level manufacturing wage rate used as a proxy for *URW (Urban Real Wage)*:  
Real wage deflator: Urban CPI – 2007 base year.  
8 missing observations (out of 108) – remedy: linear intrapolation.
- Province-level rice price index is used as a proxy for *our agricultural price variable: AGP* (2007 base year).
- Quarterly manufacturing GDP (*UGDP*) is used as a proxy for any urban sector demand for labor not captured by the manufacturing wage rate. (No data are available beyond bi-annual frequency for urban employment or unemployment)  
Real GDP base year: 2007.
- Natural log transformation of data; coefficients are elasticities

# Examination of Wage Rate Data

- To begin, we look at the operation of the manufacturing and agricultural labour markets
  - Specifically we observe patterns in the manufacturing wage rate, the agricultural wage rate, and their ratio
  - We want to know how wage rates have changed over our data period, and whether we can see systematic patterns in those wages
  - This is background data, used for “ground-truthing” and understanding how these markets work, to be augmented later by more formal statistical tests on these data to answer the specific questions posed

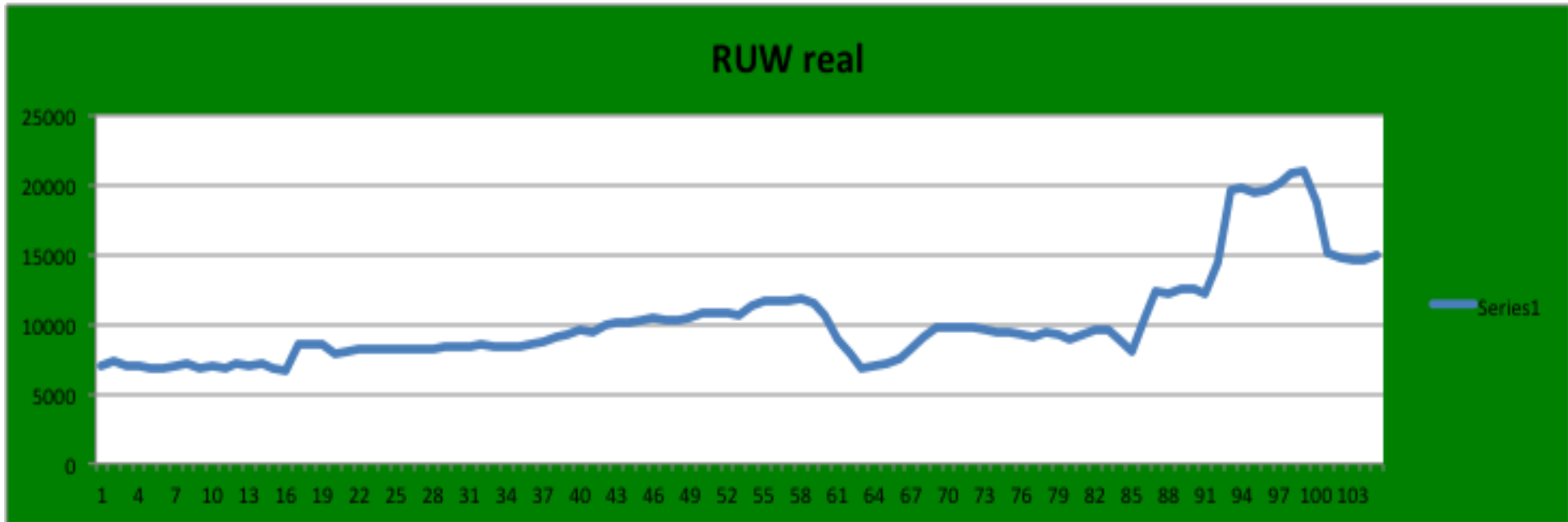
# Fig 1: Manufacturing Wage Rates (URW)

1983-2009, real terms (deflated by urban CPI)



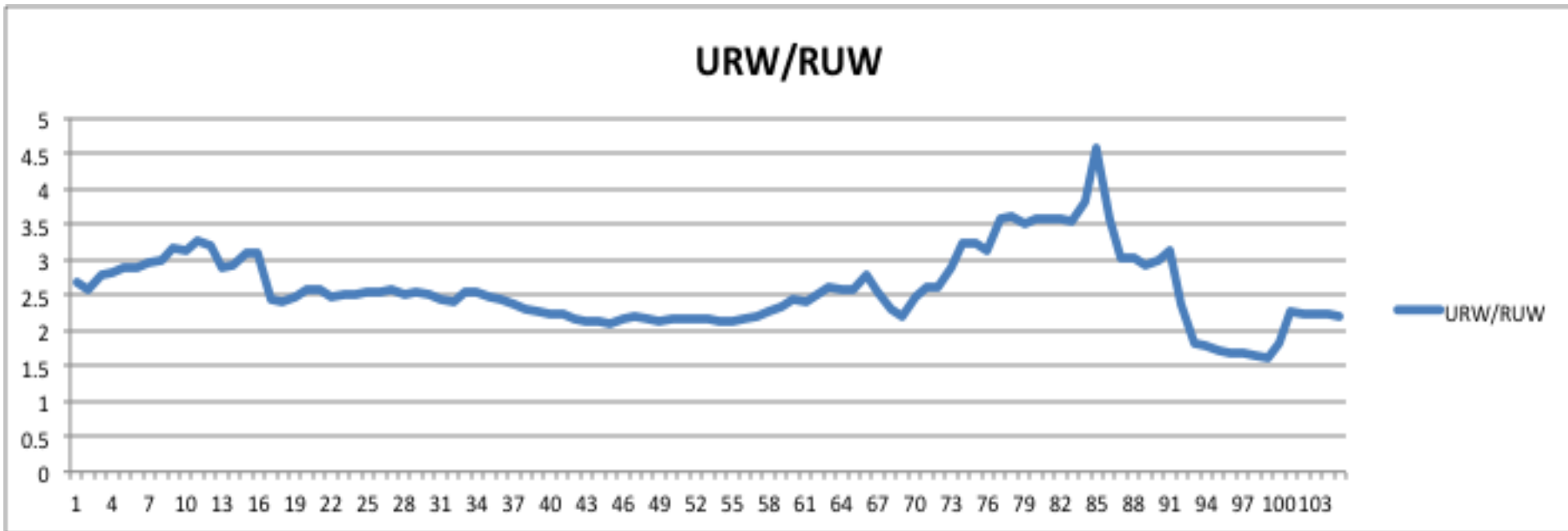
- \*Growing over period at 2.05%yr (using endpts)
- \*Declined with AFC for 5 qtrs, then moved up steadily
- \*Long period of steady growth, from Rp 19,000 to Rp. 38,000
- \*Then flat, slightly lower, for last 14 qtrs to Rp 32-33k
- \*Overall, tracks economy well; no big surprises

# Fig 2: Agricultural Wage Rate, 1983-2009, real terms, deflated by rural CPI



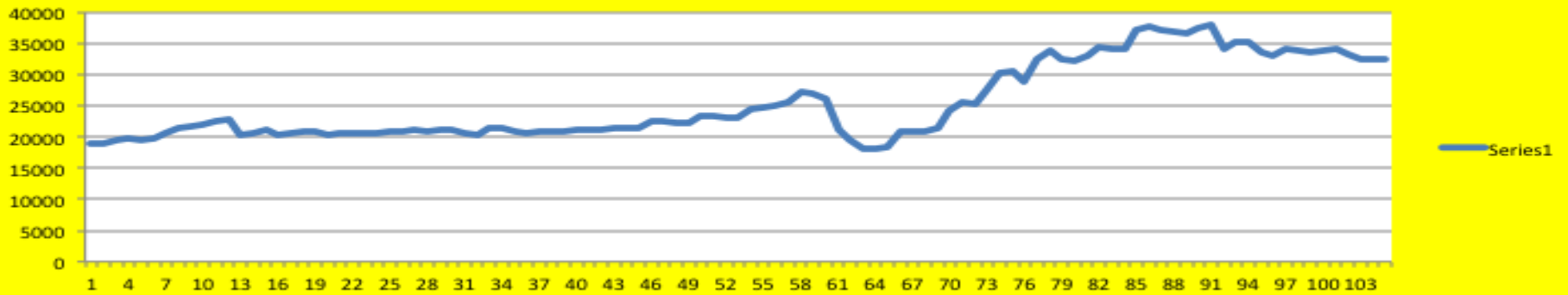
- \*Growing over period at 2.84%/yr; smooth steady growth 1983-1998 (like mftg wage)
- \*Large drop at AFC for 5 qtrs, then moves back up (identical to mftg wage)
- \*Flattens for 15 qtrs before climbing again (*unlike* mftg wage)
- \*Dramatic upward shift in 2005:III, from Rp. 12k to Rp.19k in only 2-3 qtrs (*unlike* mftg w)
- \*Finally, falls back to Rp. 15k in last year of data
- \*Similar to manufacturing wage rate, but with notable differences since AFC (1998/99)

# Fig 3: Mftg/Agric Wage Ratio



- \*LR gradual decline in ratio, from 2.5-3.3, down to 1.6-2.2; shows gradual wage convergence
- \*After an early rise, very stable, slightly declining to later 90s, then strong rise to peak 2004:
- \*No real evidence of AFC (both wage rates moving proportionately)
- \*Rising ratio as mftg wage rates rose post-AFC while Agr wage rates were stagnant
- \*Ratio fell as Ag wages rose strongly relative to mftg wages in post 2004 period
- \*\*\*Next slide allows quarter-by-quarter comparisons of these Figures 1-3\*\*\*

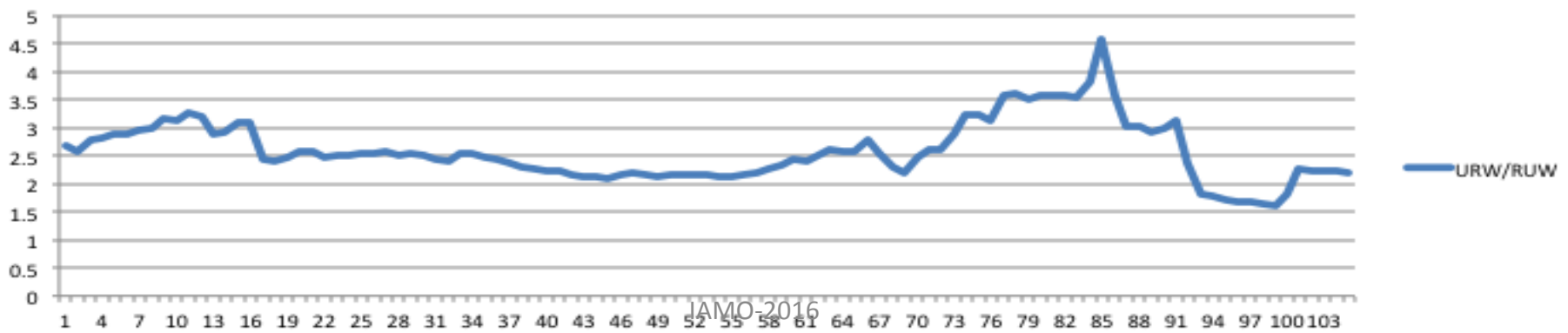
### URW real



### RUW real



### URW/RUW





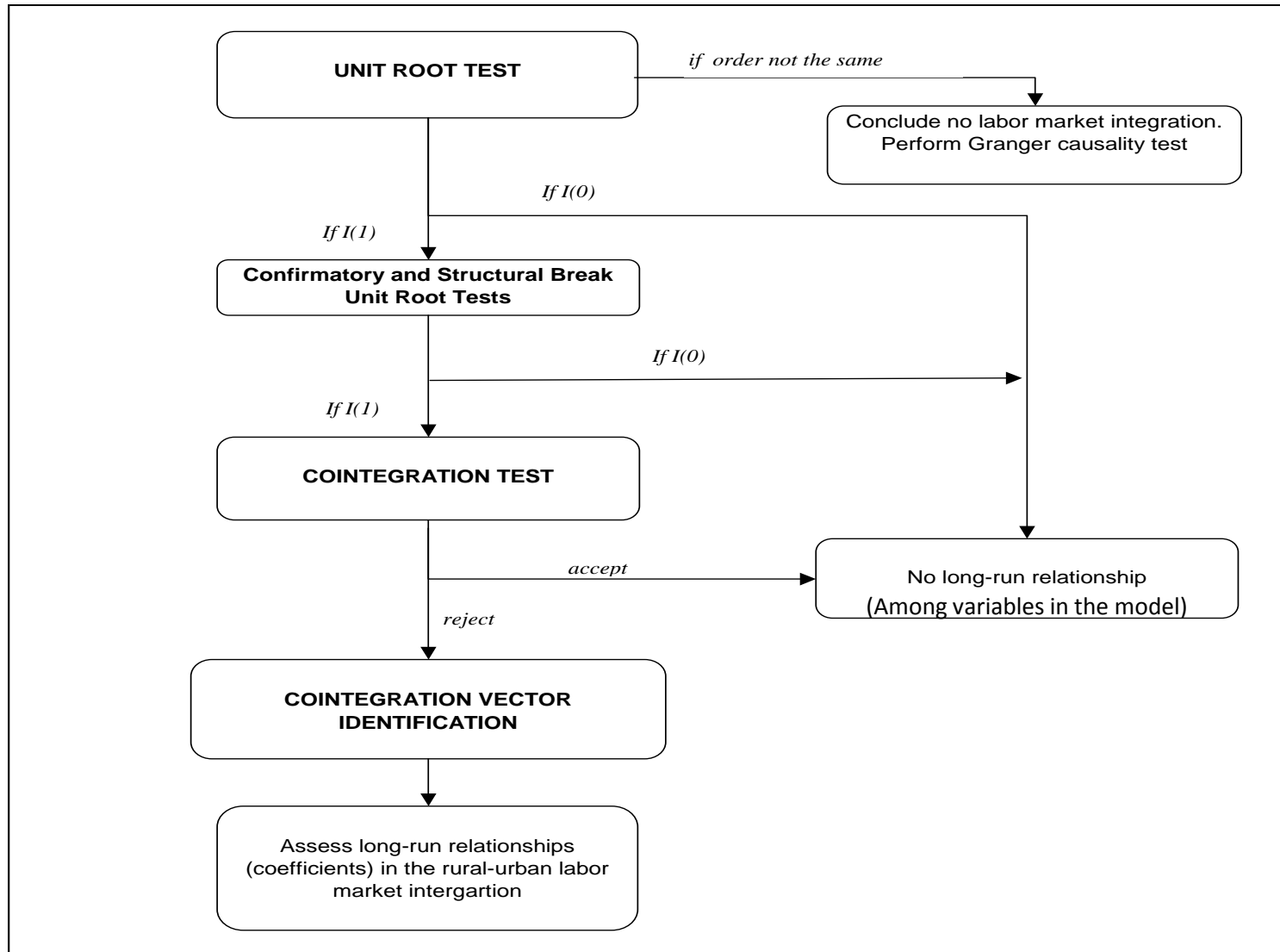
# Observations on relative wage rates

- First: agricultural and manufacturing wage rates track each other relatively closely over LR; wage data move roughly as expected (functioning labour mkts), data appear sound
- Mftg wage quite predictable, given aggregate economy's performance; Agr wage rate less so
- Post-AFC there are differences in timing between the two markets, some puzzles on patterns of agric wage rates
- Why was Agr wage flat for 4 years after AFC, when mftg wages were rising?
  - Due to slow growth (hence paucity) of mftg jobs (“protected sector”), plus slow growth in open informal sector wage rates (i.e., little external demand for farm labour)?
  - Or due to labour supply side, caution by Agr workers about returning to off-farm jobs after the big crash of 1998, waiting to see if jobs really were accessible and wage rate really had risen?

# More hypotheses on wage movements

- Labour demand story is consistent with Harris-Todaro model (AER, 1970), that there may be some quantity rationing for access to mftg jobs, that mftg wage did not fall enough in recession (rise in UE) to clear formal sector mkt
  - Informal sector is the more open (faster equilibrating) labour market; the two markets can be rather different in SR
  - Ideally we would like to add data on informal sector wage rate, also on mftg sector unemployment rate (unavailable over time period)
  - Some of this very likely picked up by GDP growth rate variable, capturing demand shifts that mftg wage rate does not
- Second large puzzle: What prompted dramatic increase in Agr wage rates after 2005:III (or 2004:I)?
  - Due to strong (belated, lagged) migratory shift to urban sector?
  - Due to strong commodity market price boom (2007-08)? But Ag wage rate jump began 2004, well before the cereal price boom

# Statistical Methodology



# Unit Root Tests

- Unit root tests were performed on all time series variables to determine if that variable is stationary or non-stationary
  - Three different unit root tests: ADF, PP, and DF-GLS
  - To further confirm, we use the KPSS test, to try to reject stationarity; all this confirmed non-stationarity
  - Finally, we test for structural breaks (must rule these out); use Lanne, Lutkepohl, Saikkonen (LLS) test: further support by ruling out structural breaks
  - Based on intercept and trend specifications within those tests, none of the variables were stationary, allowing OLS estimate to get coefficient estimates

# Cointegration Tests

- Johansen procedure was used: multivariate test based on VAR model
- Three models used with different specification of cointegrating equations
  - Level data have no deterministic trends and cointegrating equations have intercepts
  - Level data have linear trends, cointegrating equations have only intercepts
  - Level data and cointegrating equations have linear trends
- Choose optimal lag length with VAR model on level data; perform residual diagnostics
- Apply optimal lag length in Johansen cointegration test
- Calculated values of critical eigenvalue statistic and trace statistic compared with critical values (Osterwald-Lenum)

# Cointegration Test Results by Province

- West Java
  - Both max eigenvalue and trace tests indicated presence of at least one cointegrating relation in every model specification at 5% significance
- Central Java
  - There is at least one cointegrating relation in every specified model, at 5%
- East Java
  - Model 1 gave same results as above
  - Models 2 and 3 gave mixed results; only the trace test found presence of at least one cointegrating relation; max eigenvalue test showed none
  - Makes us cautious about the quality of cointegration estimates under these model specifications

# Long-Run (Equilibrium) Estimates

## West Java

$$RUW = 0.26URW + 0.14AGP + 0.14UGDP + 4.54$$

*Chi-Square-stat = 2.30; p-value = 0.52*

## Central Java

$$RUW = 0.53URW + 0.17AGP + 0.19UGDP + 0.88$$

*Chi-Square-stat = 1.87; p-value = 0.060*

## East Java

$$RUW = 0.14URW - 0.70AGP + 0.19UGDP + 0.02t + 6.83$$

*Chi-Square-stat = 7.77; p-value = 0.05*

Further zero restriction of AGP coefficient is binding with Chi-Square-stat = 9.03 and p-value = 0.06

# Long Run Equilibrium Results

Explanatory Variables	West Java	Central Java	East Java
Rice Price	0.14	0.17	0
Mftg wage rate	0.26	0.53	0.14
Urban GDP growth rate	0.14	0.19	0.19
Constant	4.5	0.88	6.83

- All values are elasticities (=Percentage change in farm wage rate for 1% change in explanatory variables)
- Recall that we are most interested in comparing the effect (elasticities) on farm wage rates of (a) agricultural demand (rice price) with the effect of (b) urban demand (mftg wage rate, urban GDP growth rate)



# Results

1. Mftg wage rate is highly important in determining the farm wage rate
  - Farm wage rates rise by 0.3% for a 1% rise in mftg wage
2. The rice price has a much smaller (1/3 as big) effect
  - Farm wage rates rise by only 0.1% for 1% rise in mftg wage
  - Looking at the ratio of the elasticities, on average the mftg wage has 3 times the effect of the rice price on farm wage
3. The urban *GDP growth rate* consistently raises farm wages by almost as much as the mftg wage rate, with an average elasticity of nearly 0.2

# Effects on farm wage since 2000?

- These are long run elasticities, but if applied to events of last decade we could say
  - The yr 2000 introduction of *rice tariff* = 25% would have raised farm wage rates by 2.6%, *once and for all*
  - With *urban GDP growing* at 5-7%/year, this factor would have raised farm wage rates by 1.0 to 1.5% per year, or by *10-15% over the decade*
  - *Mftg wage rates* rise each year, but even if they rose only as fast as GDP, this would have raised farm wage rates by an *additional 1.5-2.1%/yr*, or *15-21% for the decade*
  - The 1-time rice tariff increase boosted fm wage rates by *only 1/7<sup>th</sup> to 1/8<sup>th</sup> as much as mftg wage growth did*; *non-farm factors raised wage rate >10X more*

# Conclusions and summary

- This study gives clearer view of rural-urban labour mkt linkages, and its role in determining rural wage rates
- Wage rate patterns appear largely predictable, especially the manufacturing wage rate
- Agricultural wage rates in long run are mostly caused by nonfarm factors, only modestly affected by farm prices
- Therefore, LR impact of govt trade policy, via raising rice P, likely very limited effect on rural wages, and poorest farmers in Java
  - The 25% import tariff (2000) raised rural wage rates by merely 3% in W Java, 4% in C. Java, 0% in E Java, and this was a once-and-for-all increase
  - By contrast, urban wage + GDP growth raised wages more than 10X as much, increasing it annually

# Policy Implications of these results

- The implication for poverty alleviation policy from these 1983-2009 data for Indonesia is clear:
  - Increased migration is a more powerful tool for raising agricultural wage rates than agricultural trade protection
  - This is accomplished not only by keeping off or removing restrictions on migration
  - It is also necessary to keep the non-agricultural economy growing, the non-agricultural wage rate rising, and for agricultural and rural labourers to have the necessary education levels to compete in the non-agricultural labour market
  - From other research we know increased trade protection for agricultural products has its effects and they are regressive: helping raise land prices for farmers who own land, and raising costs for all consumers, especially poor ones
  - These results are to some extent country-specific: care must be taken in applying these lessons to other countries with differing labour market circumstances