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Structural Change in Space
Comparing the Spatial Distribution of Employment in Selected Sub-Saharan Countries

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Learn to Compete: Industrial Development and Policy in Africa UNU-WIDER Conference

Helsinki, June 25th, 2013

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Contents

In this presentation:

1) Motivation
2) Theoretical predictions
3) Data and methods
4) Results
5) Discussion and Conclusions

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Motivation

- Recent wave of interest in developing clusters, Special Economic Zones or Export Processing Zones in SSA countries
- However, not much is known about the actual distribution of employment within SSA countries and its evolution over time
- This paper establishes a set stylized facts on the spatial distribution of wage and non-wage employment for a set of SSA countries before and after structural reforms
- Contrast stylized facts with predictions from New Economic Geography models and inform about the feasibility of developing industrial clusters in SSA countries

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Theoretical predictions

- New Economic Geography (NEG): large firms producing under Increasing Returns to Scale (IRS) locate near large consumer markets and export to distant smaller markets after paying transportation costs (t)
- SSA countries: high t's and small scale of production → How applicable is the NEG framework for SSA countries?
- Under NEG, without IRS firms disperse in space in search for consumers. In resource-rich countries spatial disparities are due to the uneven distribution of endowments (e.g., natural resources) over space

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Theoretical predictions

- Gollin et al (2012): resource-rich African countries have agglomerations based on the consumption of non-tradables ("consumer cities"), as opposed to the consumption of tradable manufactures or services ("production cities")→ benefits from agglomeration?
- Gerrtise & Moreno-Monroy (2012): A large small-scale informal sector may impede the emergence of a large-scale manufacturing sector → diminishing transportation costs may not be enough to bring about agglomeration
- Behrens & Pholo Bala (2011): Skilled workers can choose to become part of an unproductive urban elite, so that rent-seeking behaviour can result in agglomeration and urban primacy→ benefits from agglomeration?

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Data sources and adjustments

- (Spatially) comprehensive employment series population census random samples (10%) provided by the Integrated Public Use Microdata Series (IPUMS) for **Tanzania** 1988 and 2002; **Guinea** 1983 and 1996; **Senegal** 1988 and 2002; **Malawi** 1987 and 1998; and **Mali** 1987 and 1998
- Different level of spatial disaggregation by country and year → analysis at comparable units in terms of relative extension and number of observations (e.g. province/department/region)
- Changes in boundaries: indicators and maps are constructed using the oldest boundaries

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Data sources and adjustments

- Employees classified using comparable variable “class of worker” as **wage** if class of worker = “worked for someone else as wage/salary worker”, and as **non-wage** if class of worker = “self-employed or “unpaid worker” (apprentices and family workers)
- Underlying assumption: non-wage employment corresponds to small scale activities producing non-tradable goods and services. Wage employment corresponds to larger scale public and private activities
- Employment breakdown by four industries: “Agriculture and Mining”, “Secondary”, “Market Services” and “Non-Market Services”. N/A for Tanzania 1988, Guinea 1996 and Senegal 2002

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Data sources and adjustments

Table 1: General characteristics

Country	Year	Area (in km2)	GDP per capita, PPP (constant 2005 USD)	Population	Population density (persons per km2)	% urban
Tanzania	1988	948,087	822.99	23,104,240	24.37	18.04*
	2002		936.78	37,327,350	39.37	39.7
Guinea	1983	245,857	N/A	4,578,370	18.62	25.7
	1996		833.27	7,290,710	29.65	29.9
Senegal	1988	196,190	1,521.71	7,001,990	35.69	38.36*
	2002		1,524.59	9,945,620	50.69	40.62
Malawi	1987	118,484	596.90	7,986,690	67.41	10.66
	1998		670.24	9,913,930	83.67	14.46
Mali	1987	1,240,000	627.41	7,853,840	6.33	21.94*
	1998		707.61	9,913,300	7.99	27.11

*Source: WDI and own elaboration based on IPUMS data. *indicates urban share drawn from WDI*

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A-spatial measures of concentration

- Coefficient of variation (CV): Ratio of the standard deviation over the mean of (wage and non-wage) employment. CV=0 -> uniform distribution, increase in CV over time → employment became more concentrated

- CV is “a-spatial”: it is not informative about the location of agglomerations and doesn’t consider geographical interaction. However it is comparable over time and across countries

- Degree of concentration by industries measured with the Theil index (GE(1)) and the half the squared coefficient of variation (GE(2)). A higher value of GE(1)/GE(2) indicates larger concentration

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Spatial measures of concentration

- Global Moran's I: Index which expresses the overall degree of similarity between spatially close regions (spatial autocorrelation) with respect to a numerical variable, i.e. wage or non wage employment
- Spatial interaction is measured by an inverse distance matrix. Distance is measured as bilateral distance between region's centroids
- The index can take a positive (negative) statistically significant value, indicating that nearby regions exhibit similar (dissimilar) values of wage or non wage employment; or it can be statistically insignificant (null hypothesis is spatial randomness)
- A Local Indicator of Spatial Association (LISA) indicates *where* clusters (or cold spots) are located in space, i.e., identifies regions with high (or low) employment which are surrounded by neighbors with high (or low) employment

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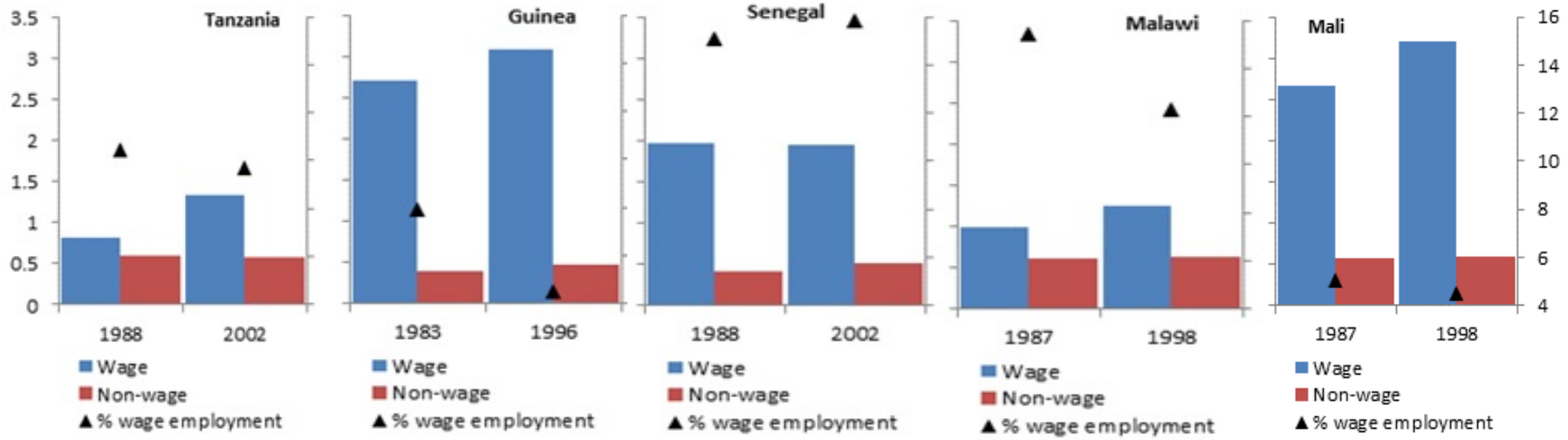
Figure 1: CV by country, year and type of employment



- In all countries except Senegal, *wage employment became both smaller in size and more concentrated*. This concentration is partly explained by an increasing concentration of wage employment in the largest city
- Non-wage employment is *far less concentrated and follows a different trend over time* than wage employment in all countries
- In Tanzania, non-wage employment became more dispersed between 1988 and 2002. In Malawi and Mali it remained stable. In Senegal and Guinea, it increased from initially very low levels

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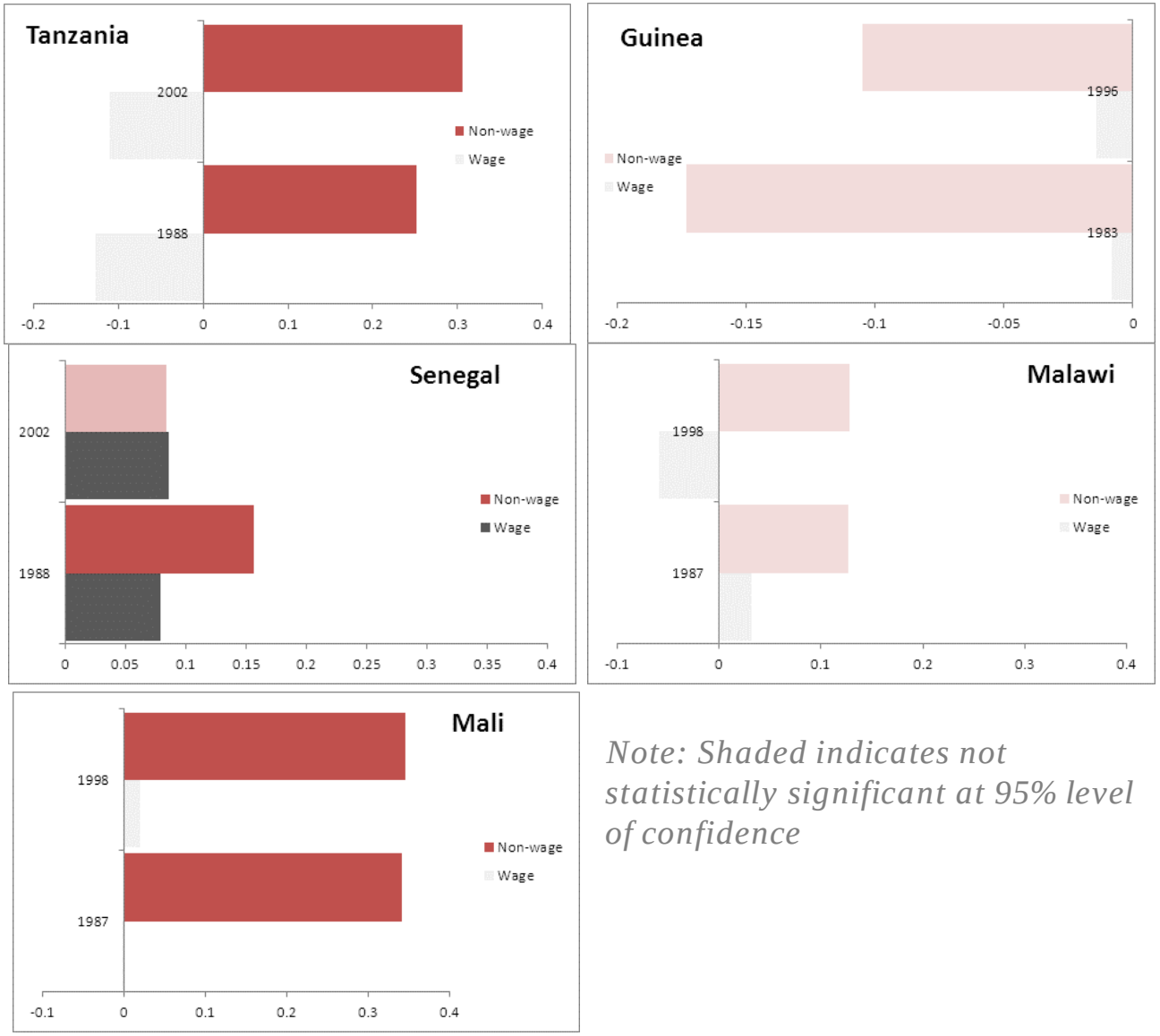
Concentration by industries

- GE(1) and GE(2) (not shown) for all industries close to lower bound → generally very low level of employment concentration
- Highest concentration levels in market services (except Guinea 1983), and lowest in Agriculture and Mining (by far the largest employer) before and after structural reforms
- Non-wage employment absolutely less concentrated than wage employment in Agriculture & Mining, Secondary and Market Services for all countries and years
- In Malawi and Mali over time: 1) no movement of employment toward sectors displaying larger concentration, and 2) increase in the share of “dispersed” non-wage employment

Figure 2: Global Moran's I Indicators, by country, type of employment and year



Note: Shaded indicates not statistically significant at 95% level of confidence

No global spatial autocorrelation of wage employment for all countries except for Senegal → concentration of wage employment does not "spill-over" neighboring regions

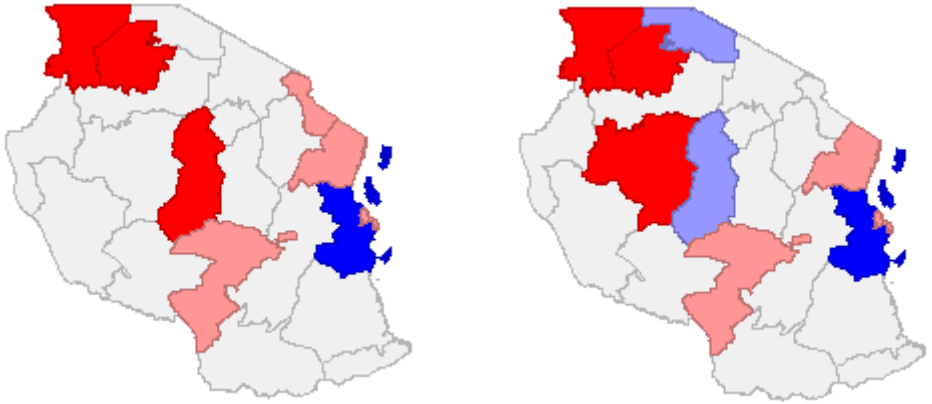
Markedly different patterns for non-wage employment (except in Senegal)→ positive and relatively high for Tanzania and Mali

Figure 2: Local Moran's I Indicators, by country, type of employment and year

Tanzania

a) Non-wage employment, 1988

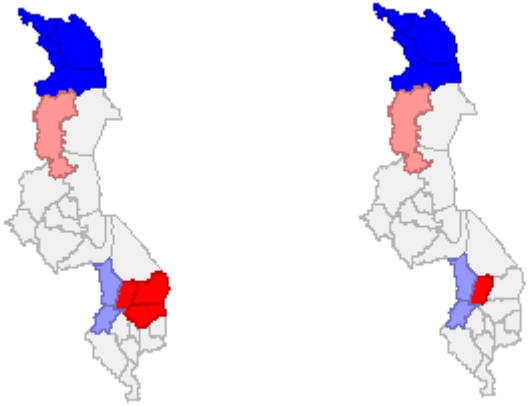
b) Non-wage employment, 2002



Malawi

a) Non-wage employment, 1987

b) Non-wage employment, 1998



No significant hot-spots or clusters of wage employment for Tanzania, Guinea and Malawi

Center of non-wage employment clusters in Tanzania at highly populated area near Lake Victoria (mining areas); cold spots around Dar-es-Salam

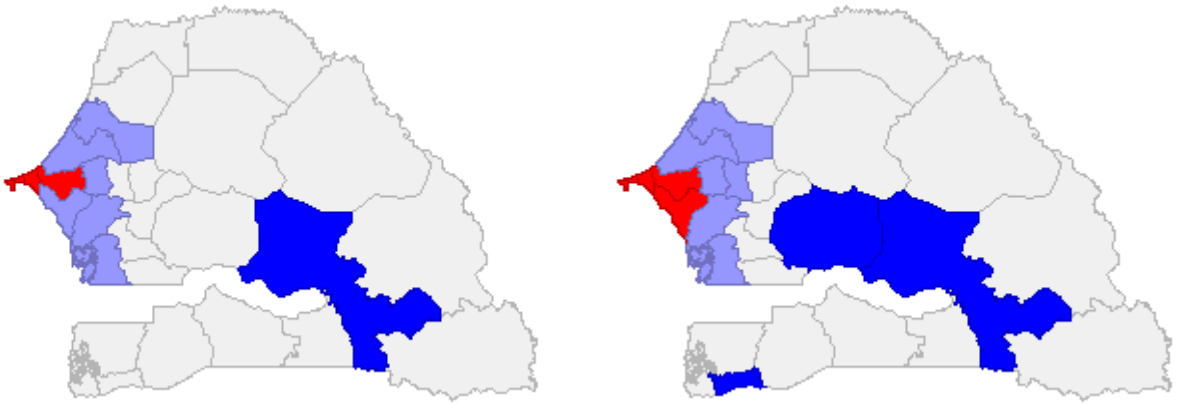
Persistency of center of clusters of non-wage employment over time

Figure 2: Local Moran's I Indicators, by country, type of employment and year

Senegal

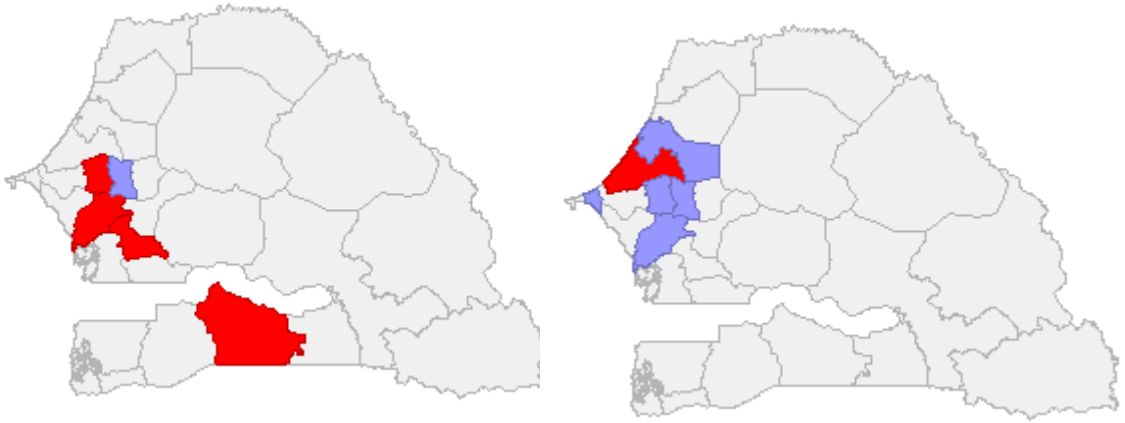
a) Wage employment, 1988

b) Wage employment, 2002



a) Non-wage employment, 1988

b) Non-wage employment, 2002



Significant and stable cluster of wage employment in the Dakar Region and Thiès department in the coast of Senegal

Non-wage employment located in different sub-national units than the wage employment clusters (similar for Mali)

Weaker cluster identified in a *cercle* surrounding the capital city, Bamako in Mali (not shown)

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Discussion and Conclusions

- Increasingly localized concentration of wage employment (except for Senegal). Smaller numbers fall mostly under non-market services and not in large-scale establishments producing tradables
- Spatial allocation of non-wage employment in space mostly explained by the distribution of natural resources (e.g. in Tanzania) and new urban settlements 'dispersed' in interior areas ("consumer cities") → Evidence at odds with policy frameworks considering the "creation" of employment clusters?
- Low levels of concentration and small variation across industries→ Movement of employment toward more concentrated sectors and change within sectors with respect to the scale of their activities (i.e., more wage employment) both necessary for structural transformation

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Thank you

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Appendix

Figure 1: Distribution of wage and non-wage employment

Tanzania

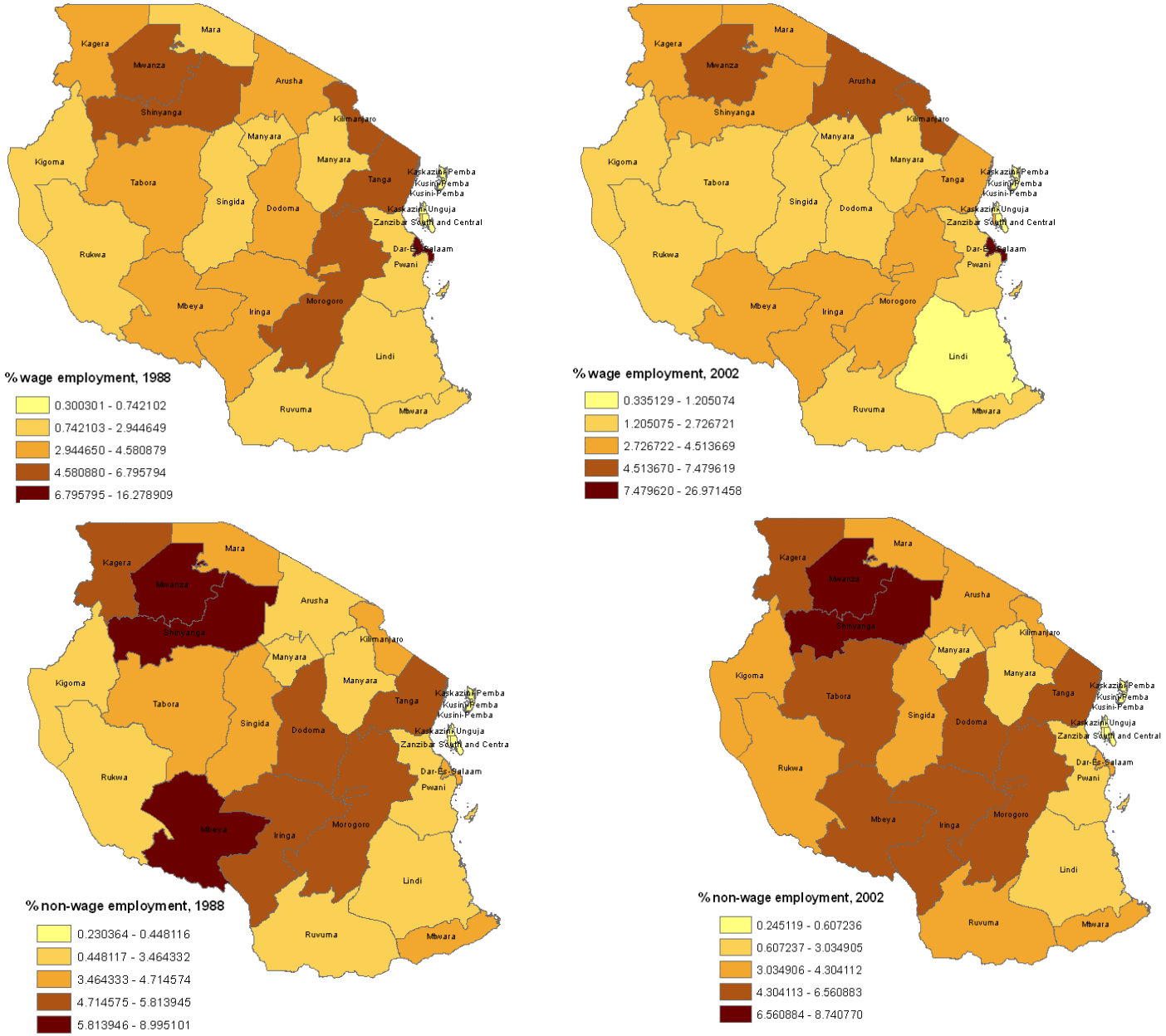
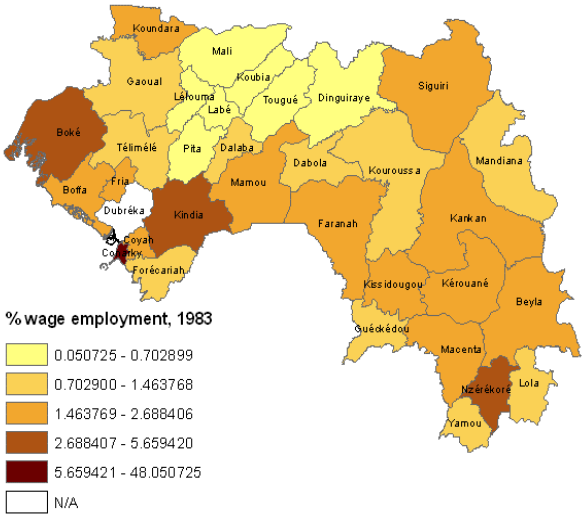
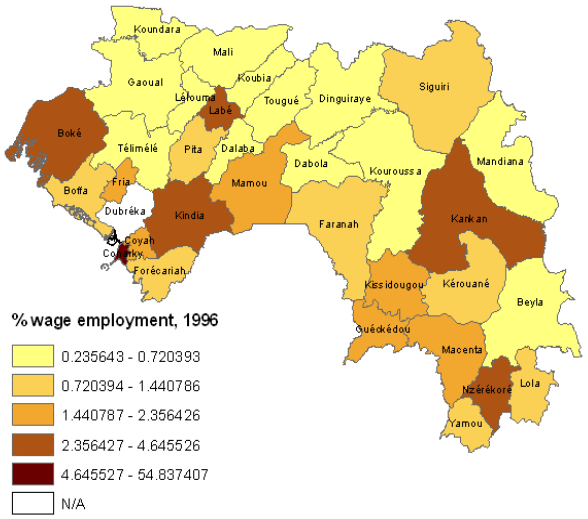
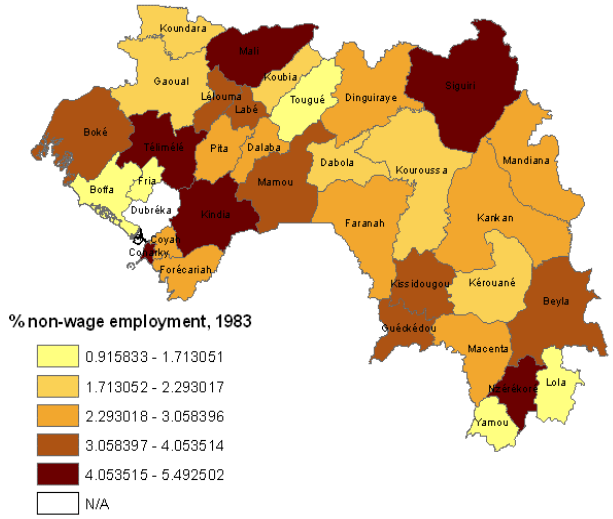


Figure 1: Distribution of wage and non-wage employment

Guinea







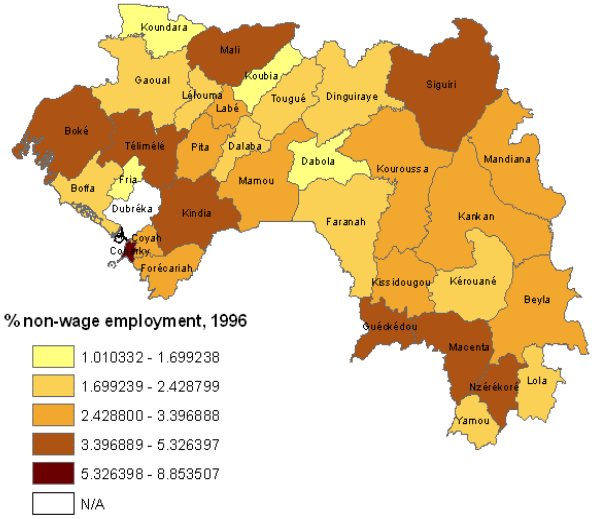


Figure 1: Distribution of wage and non-wage employment

Malawi

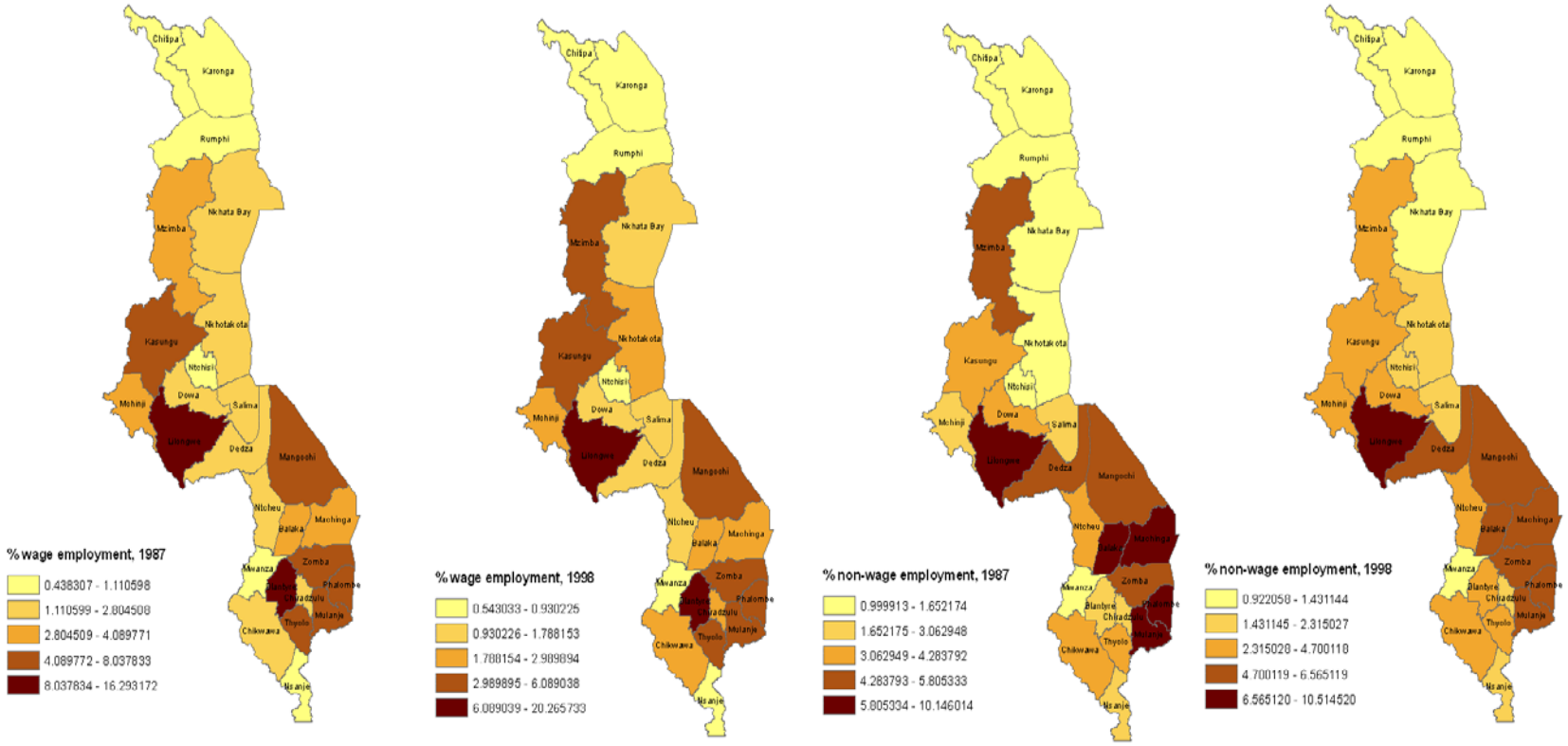


Figure 1: Distribution of wage and non-wage employment

Mali