# Employment Intensity and Scale of Operation in Agro-processing: A Case of Cereal Millers in Tanzania

Jason Snyder, Dr. David Tschirley, Claire Ijumba, Mayuko Kondo

# Background

- Tanzania – and African economies in general – need rapid growth in employment to absorb their rapidly rising youth population
- Anticipated growth in demand through markets for processed food could potentially contribute to this
  - Massive agribusiness opportunity for local firms
- Question: Does it matter to employment who captures this growth?
- If mostly imports, then little employment will be created
- What about local firms? Does it matter which firms capture market share?

# Background (2)

- Industry concentration typically follows J curve over time,
  - First declining concentration for some period after liberalization
  - Followed by rising concentration
- Larger firms tend to use more capital
  - Should expect less labor for a given amount of output
  - Rising concentration will reduce impact of this growth on employment

# Outline of presentation

- Address the following research questions using data from the maize milling sector in Tanzania
  - What is the observed relationship between firm size and labor use?
  - What might this imply about employment under alternative scenarios of growth in demand for processed foods?
  - How competitive are small firms and how much upward mobility is there?
- Discuss policy implications

# Data

- Survey of maize flour businesses in Dar es Salaam: Sept. – Nov. 2016
- Systematic random sample
  - Full listing and random sample of millers in known maize milling clusters
  - Random sample of remaining wards with full listing and random sample
  - Sampled mills each day of the week in order to list and randomly sample brand owners that don't operate machinery

# Data (2)

- Total sample size of 313 flour businesses
  - 66 that only mill for own brand
  - 43 that mill for themselves and provide milling services (to other businesses and/or consumers)
  - 91 that don't operate machinery, but purchase milling services and sell flour
  - 113 that don't have own brand, but provide milling services (to other businesses and/or consumers)

# Relationship between firm size and employment intensity

- We define employment intensity as the labor:output ratio (LQ)
  - Defined here as the number of Full Time Equivalent (FTE) workers needed to produce 1 million TSH in receipts:

| Business type | Total receipts (million TSH) | Size terc | # of obs | Mean Labor / Output ratio (FTE employees /million TSH) |
|---|---|---|---|---|
| All businesses | 3.0 | 1 | 61 | 1.104 |
| | 9.6 | 2 | 44 | 0.186 |
| | 30.6 | 3 | 59 | 0.079 |
| | 112.5 | 4 | 66 | 0.023 |
| | 886.4 | 5 | 77 | 0.008 |
| | 206.2 | All | 307 | 0.283 |

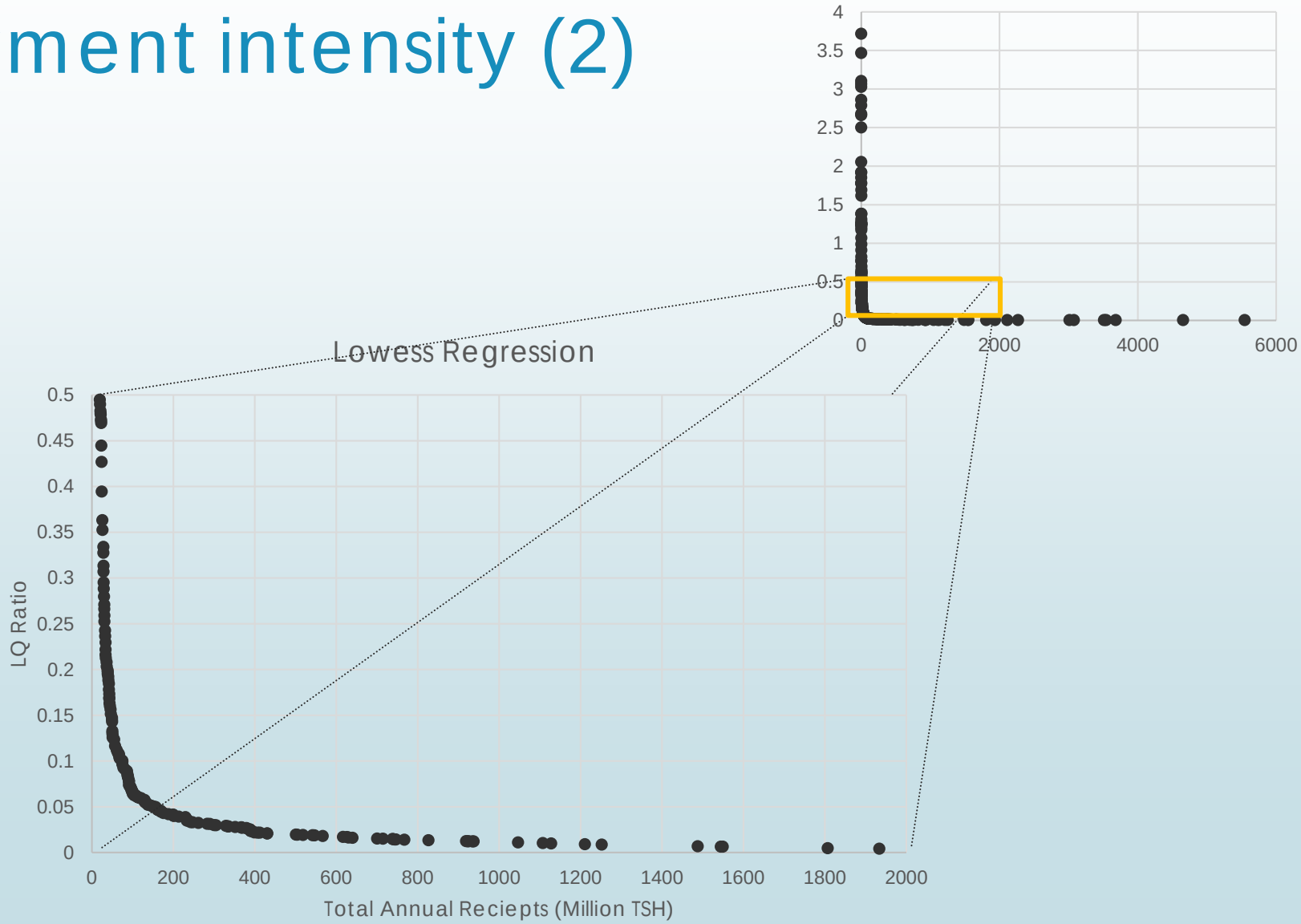
# Relationship between firm size and employment intensity

- We define employment intensity as the labor:output ratio (LQ)
  - Defined here as the number of Full Time Equivalent (FTE) workers needed to produce 1 million TSH in receipts:
  - This ratio falls dramatically with firm size
  - This means that larger companies employ fewer workers per unit of revenue.

| Business type | Total receipts (million TSH) | Size terc | # of obs | Mean Labor / Output ratio (FTE employees /million TSH) |
|---|---|---|---|---|
| All businesses | 3.0 | 1 | 61 | 1.104 |
| | 9.6 | 2 | 44 | 0.186 |
| | 30.6 | 3 | 59 | 0.079 |
| | 112.5 | 4 | 66 | 0.023 |
| | 886.4 | 5 | 77 | 0.008 |
| | 206.2 | All | 307 | 0.283 |

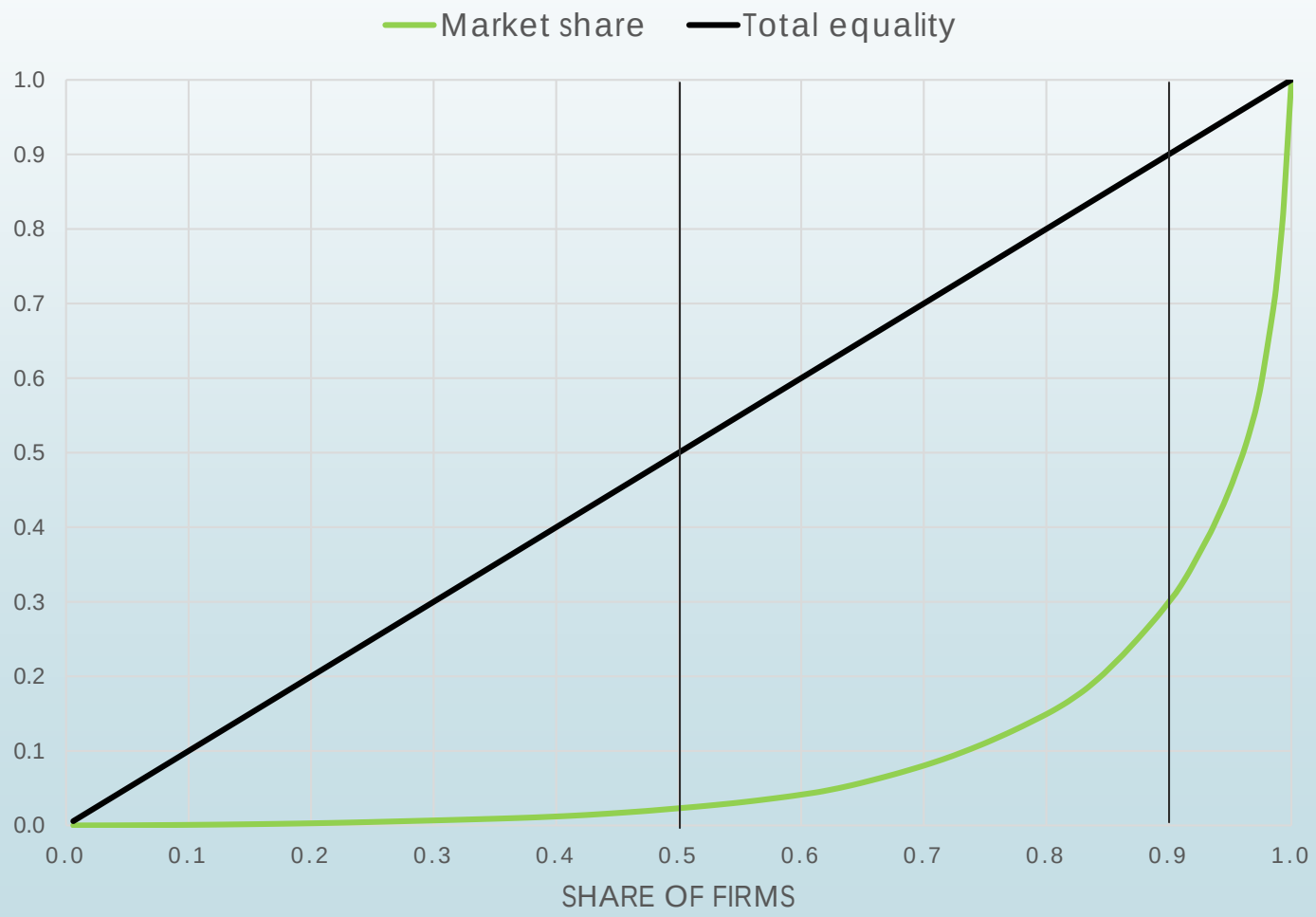
# Relationship between firm size and employment intensity (2)

- Lowess regression of LQ ratio on sales
- Locally weighted, non-parametric regression
- We see a rapid drop in the LQ ratio at very low levels of Q
- LQ ratio starts to level off around 100 million TSH annually



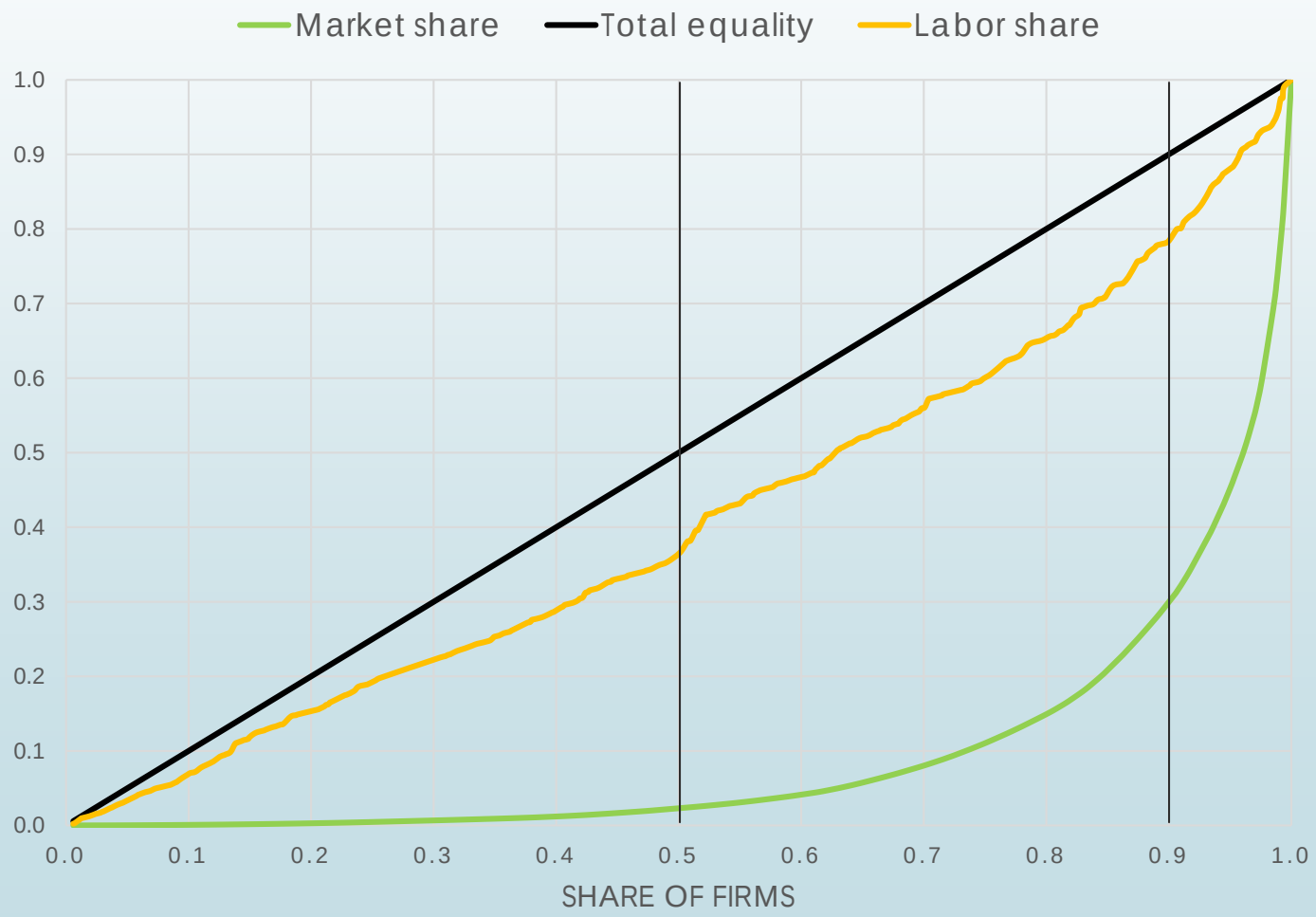
# Relationship between firm size and employment intensity? (3)

- Gini curve
  - Share of firms on horizontal axis
  - Market share on vertical axis
- Market share is heavily skewed towards larger firms
  - The smallest 50% of firms only have about 2% of the sales
  - The largest 10% have about 69% of sales



# Relationship between firm size and employment intensity (3)

- Gini curve
  - Share of firms on horizontal axis
  - Market share on vertical axis
- Market share is heavily skewed towards larger firms
  - The smallest 50% of firms only have about 2% of the sales
  - The largest 10% have about 69% of sales
- However, lots of employment coming from smaller firms
  - The smallest 50% of firms employ about 37% of workers
  - The largest 10% employ about 20% of workers



# Implications of growth in demand on employment

- 10 year projection, assuming (computed in earlier work):
  - Urban population growth of 3.5% per year
  - 2% per capita income growth per year
  - Expenditure elasticity of 0.4
- Results in:
  - 41% increase in population
  - 22% increase in per capita income
  - 9% increase in per capita demand
  - 53% increase in total demand
- The employment implications of 4 structural scenarios

# Simulating the employment implications of 4 Structural Scenarios

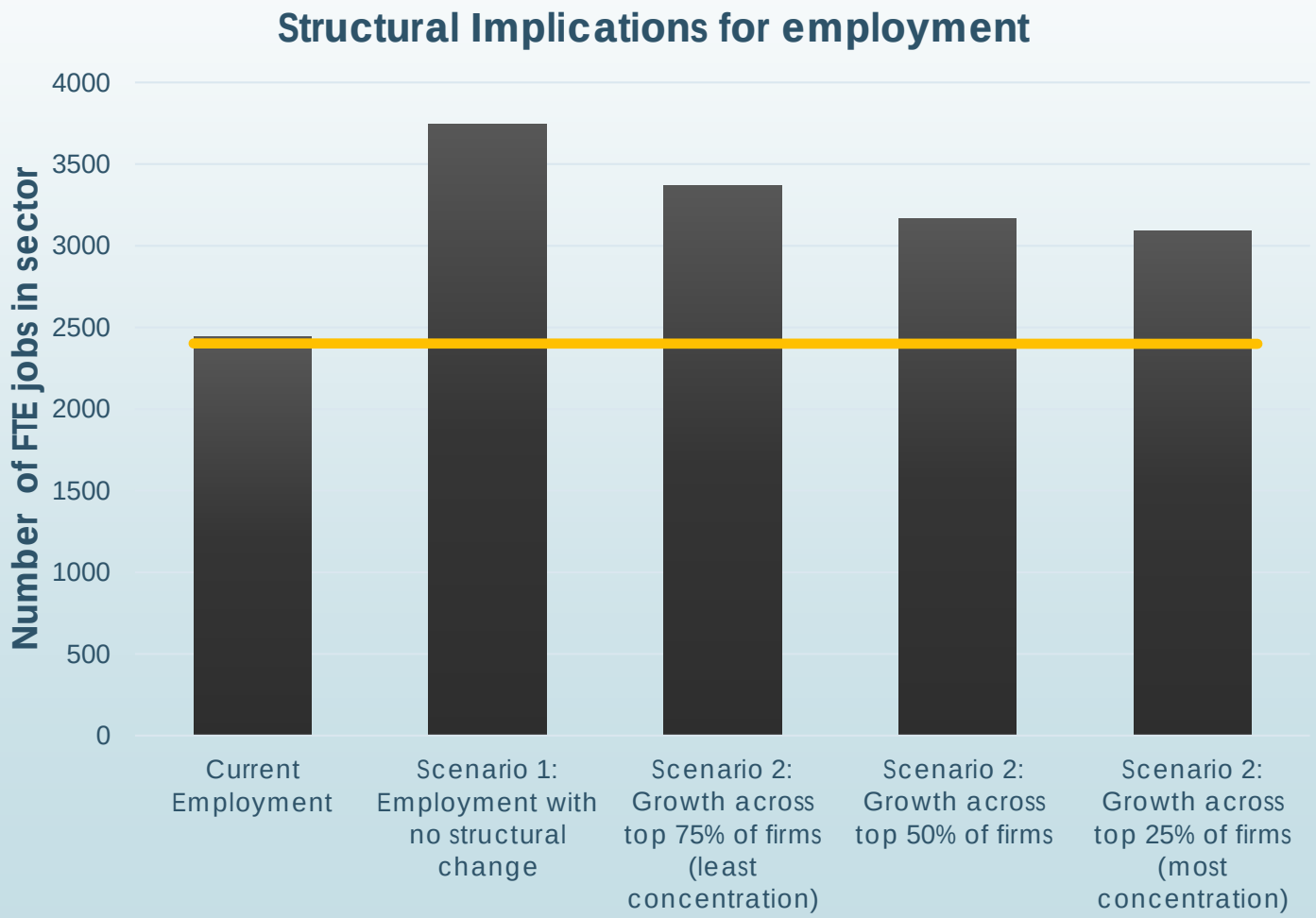
- Scenario 1: No structural change
  - Maintain the current distribution in absolute size of firms
  - Assume that the number of firms of each size increases by the increase in total demand
- Scenario 2: Low concentration
  - Assume that the increase in total demand is distributed across top 75% of firms in proportion to their current share among those 75%
  - Bottom 25% stays in market but does not grow in size

# Simulating the employment implications of 3 Structural Scenarios (2)

- Scenario 2: Mid concentration
  - Assume that the increase in total demand is distributed across top 50% of firms in proportion to their current share among those 50%
  - Bottom 50% stays in market but does not grow in size
- Scenario 2: High concentration
  - Assume that the increase in total demand is distributed across top 25% of firms in proportion to their current share among those 25%
  - Bottom 75% stays in market but does not grow in size

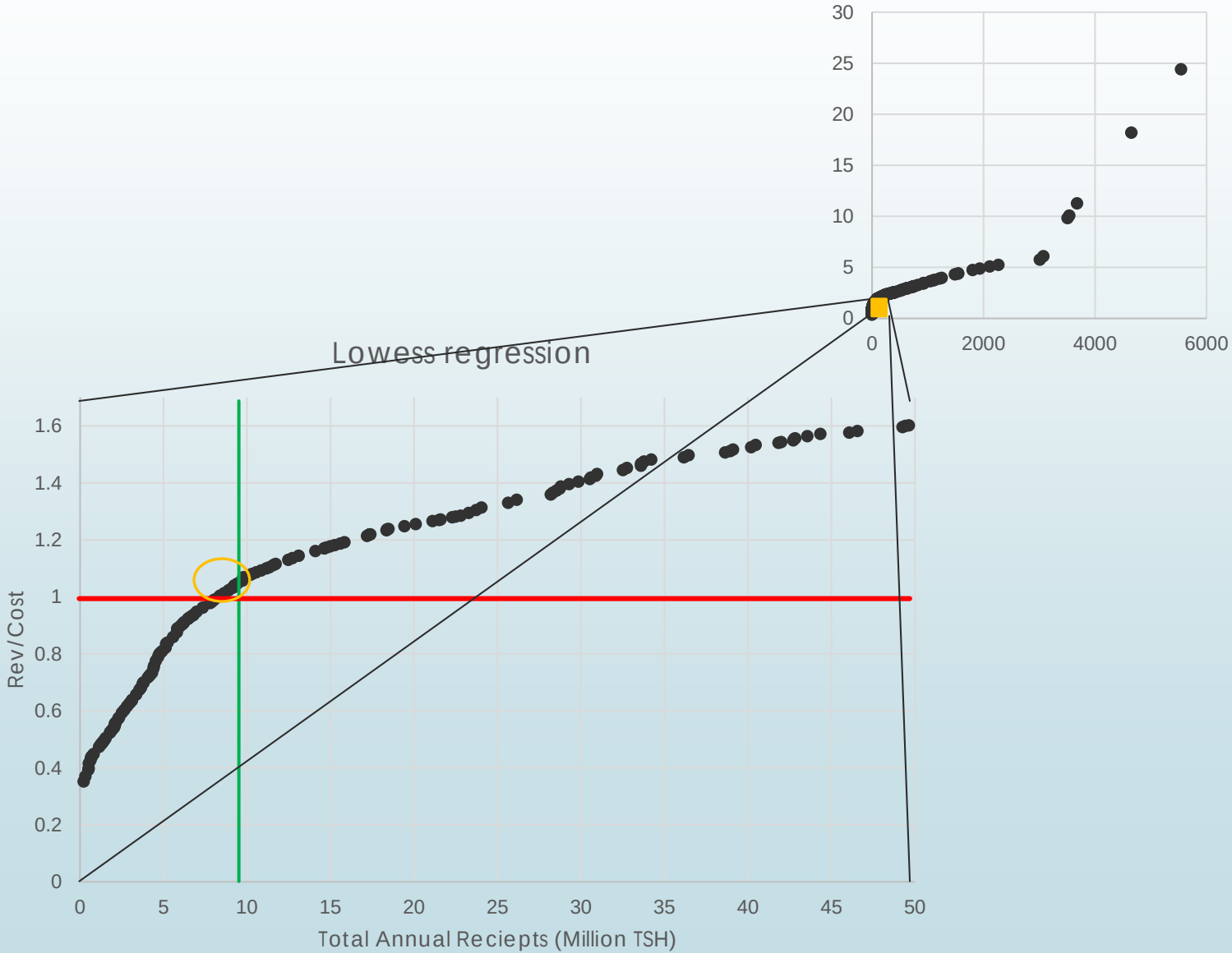
# Structural Scenario implications for employment: 10 year projections

- Scenario 1: no structural change
  - Employment up 53%
- Scenario 2 – low concentration: Employment up 38%
- Scenario 3 - medium concentration: Employment up 30%
- Scenario 4 - high concentration: employment up 27%



# Firm competitiveness by size: profitability

- On average, profitability rises with size, especially for largest firms
- Only 17% of the smallest size-quintile of firms are profitable
- The majority of firms outside of the 1st quintile are profitable



# Firm dynamics by size: relative growth

- Relative firm kg sales quintile now and 3 years ago
  - Only includes firms that sell a product now, and at least 4 years ago
- Very little relative movement across the industry, not a lot of mobility

| | New Quintile | | | | | |
|---|---|---|---|---|---|---|
| **Quintile (3 years ago)** | **1** | **2** | **3** | **4** | **5** | **Total** |
| **1** | 23 | 0 | 11 | 0 | 0 | 35 |
| **2** | 13 | 21 | 0 | 0 | 0 | 34 |
| **3** | 0 | 7 | 16 | 8 | 0 | 31 |
| **4** | 0 | 0 | 7 | 17 | 5 | 30 |
| **5** | 0 | 0 | 0 | 6 | 20 | 27 |
| **Total** | **36** | **28** | **35** | **31** | **26** | **157** |

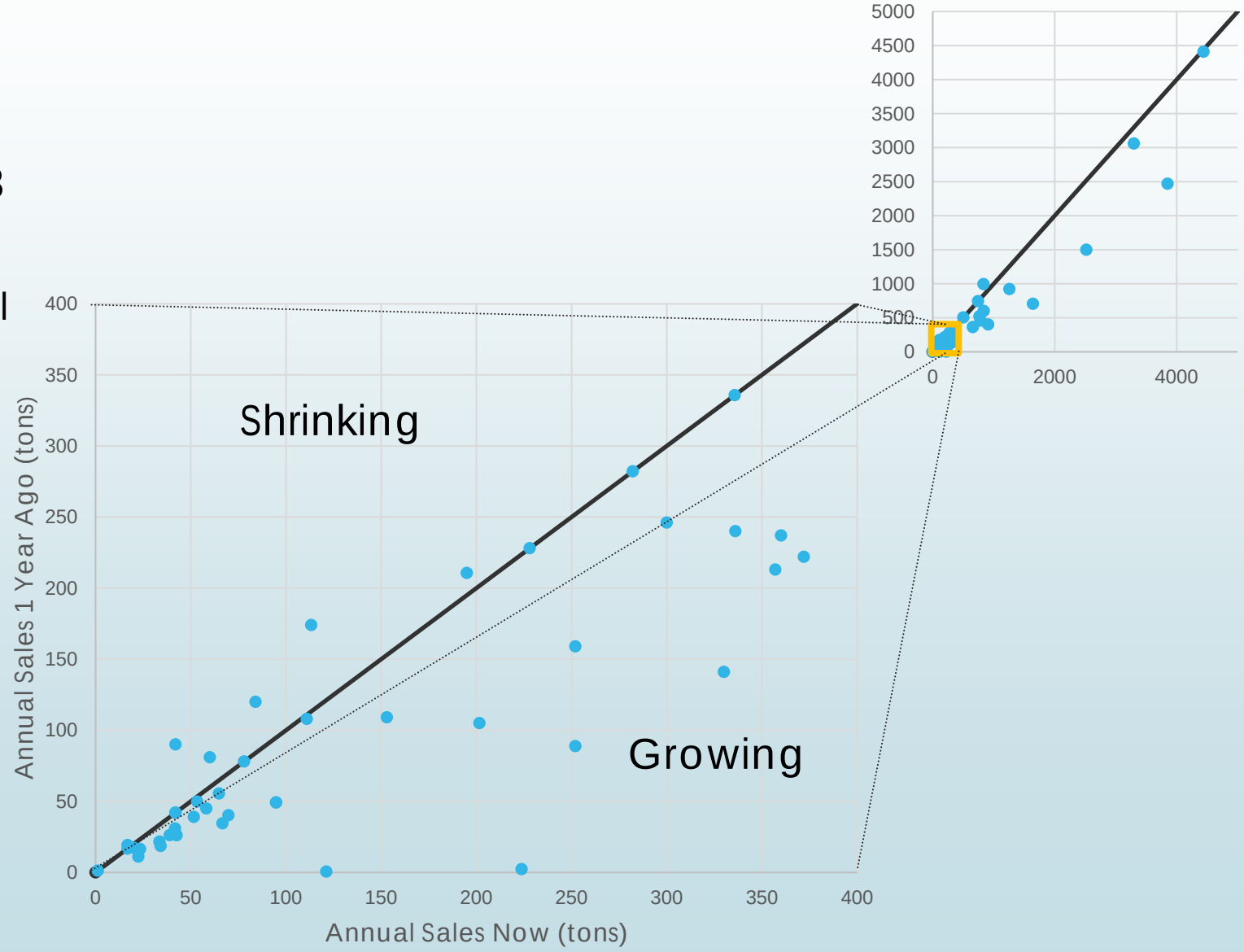
# Firm dynamics by size: absolute growth

- Kg sales quintile now and 3 years ago
  - Only includes firms that sell a product now, and at least 4 years ago

However most firms have grown:

75% have greater kg sales now

18% stayed the same



# Conclusions

- Smaller firms have a very low market share but employ many more people per unit of output.
- The majority of the micro smallest firms are not profitable and might not last in the long run
- There may be tension between policy aims of providing employment to a booming youth population and enhancing industry growth and productivity.
- There are at least two reasons to maintain a diverse firm structure
  - To avoid too much market power
  - What we have shown, to promote employment
- There is a range of options to strengthen the small and medium size sector
  - Improving access to credit, training, technology and marketing
  - Facilitating food safety certification and business formalization
  - Improving infrastructure and access to energy