

Food Processing and Innovation

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Ranges in Income Growth Rates

Countries

- **USA 3%, China 8%**

U.S. Counties 1970 to 2000

- **Lowest -1%, Highest 8%**



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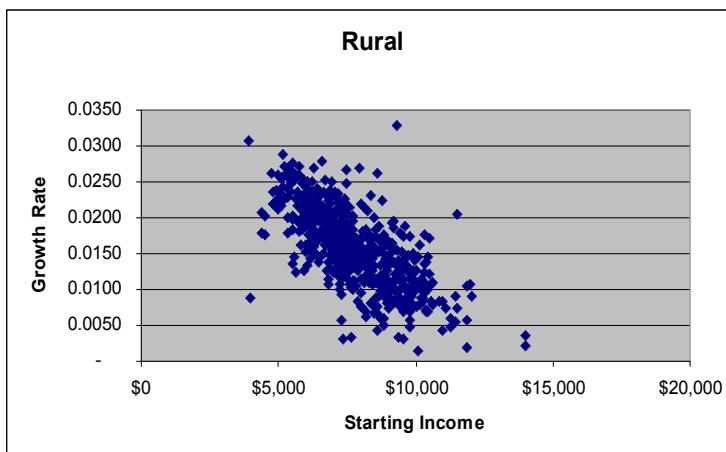
Why Growth Rates Vary

- Shrinking investment at higher levels of capital causes Income itself to grow slower at higher levels of capital
- Convergence: Rich economies grow slower than poor ones



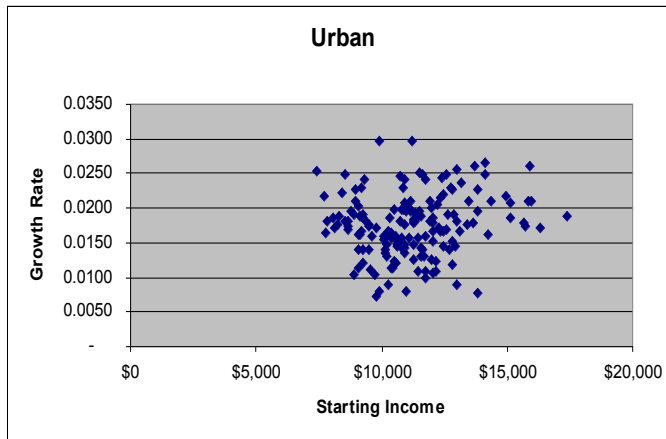
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Why Incomes Vary: Urban and Rural Convergence



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Why Human Capital?

"[K]nowledge is now the most versatile and the most important of all the factors of production, whether we can measure it or not. . . A computer wizard with a bold new program in mind can walk across a border with no tariff, carrying more capital assets within her head than might be contained in a thousand cargo ships." Berkowitz (2001)



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Evidence of the Importance Human Capital

- Clear Link between Education to Higher Incomes
- Human Capital Supports Innovation
 - Knowledge spillovers
- Effective increase in Labor Force (Lucas)



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Rural Human Capital

- Rural effects on industry mix
- Industry mix affects payoff on human capital
- Less spillover



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Measures Human Capital and Innovation?

Human Capital

- Most studies measure years of education
- Education not complete
- Regional Stocks

Innovation

- OECD Measure (Process versus Product)
- Our Survey Self Identify



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Food Processing

(Omidvar and MacDonald)

Food Processing Industry May have Procurement reasons for Rural Location.

Survey of all members of Provincial Food Processor Associations in B.C., Alberta, Saskatchewan and Manitoba.

Ask them about R & D activities and innovation

150 completed surveys



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Some definitions

- Product versus process innovation
 - Process
 - an innovation that lowers the cost of production
 - Substitute a cheaper input, rearrange a workstation to be more efficient, improved computer program for record keeping, worker training to increase productivity
 - Product
 - An innovation designed to enhance demand
 - Exploit niche markets, monopolistically competitive-type market
 - Better packaging, a food additive to make the product more tasty, enhanced nutritional characteristics

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Omidvar

Findings:

- Urban and Education levels no effect on process innovation
- Urban had higher product innovation
- Higher Education levels led to more product innovation

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MacDonald

Findings:

- More innovation if firm has access to large population (market or labor supply)
- Newer and larger firms innovate more

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Monchuk, Brewin and Partridge

Examining the Adoption of Product and Process Innovations in the Canadian Food Processing Industry

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Motivation

- Closer look at product innovation
 - Relationship between product and process innovation
 - Product innovation in general versus in-house innovation
 - Additional innovation considerations
 - Firm characteristics
 - Other innovation considerations

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Some definitions

- Innovation in general versus in-house innovation
 - Innovations in general may be adopted based on the discoveries within the firm as well as those originating outside the firm itself (may include copying, imitation, etc)
 - In-house innovations are those resulting from efforts primarily within the firm itself

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Hypotheses

- Firms will be more likely to develop their own product innovations if they also developed their own process innovations (due to synergies in the discovery process)
- In-house product innovations should be more closely tied to process innovations than general product innovations.

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Table . Summary Statistics

| Variable ^a | Average |
|-----------------------------|---------|
| Dependent variables | |
| Any Product Innovation | 0.66 |
| In-House Product Innovation | 0.50 |

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Results

- Contrast two models explaining:
 1. Any product innovation
 2. In-house product innovation
- Use probit regression
 - Inference based on robust std. errors
 - Results in terms of marginal effects/elasticities

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| | Product Innovation | | Process Innovation | |
|---|--------------------|-------------------|--------------------|-------------------|
| | In-House | Not In-House | In-House | Not In-House |
| Company Characteristics | | | | |
| Employment (100's) | 1.297 (2.80) | -0.617 (-1.62) | 0.131 (1.03) | 0.541 (2.60) |
| Year Established | 0.016 (1.71) | -0.001 (-0.09) | 0.005 (0.77) | 0.000 (0.06) |
| Distance to a Major City (1000 km) | 0.521 (0.39) | 1.641 (1.40) | 2.443 (2.66) | -0.834 (-0.83) |
| Impact of Innovation on Business | | | | |
| Enter International Markets | -0.121 (-1.18) | 0.176 (1.57) | -0.025 (-0.27) | 0.210 (2.19) |
| Keep up with Competitors | 0.506 (3.50) | -0.221 (-2.33) | 0.382 (4.70) | -0.378 (-4.28) |
| Factors Hindering Innovation | | | | |
| Lack of information on Markets | 0.224 (1.79) | -0.066 (-0.54) | -0.096 (-1.07) | -0.039 (-0.39) |
| Difficulty finding Cooperators | 0.219 (1.82) | 0.009 (0.09) | 0.013 (0.16) | 0.153 (1.83) |
| Lack of Access to Rail/Airports | -0.430 (-2.71) | 0.226 (2.16) | -0.150 (-1.27) | 0.289 (3.02) |

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Conclusions

- Greater competition is associated with more innovation
- Larger firms are a somewhat more prone to innovate.
- The relationship between product and process innovation was stronger for in-house
- Mixed results from distance to urban centre

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Policy Implications?

- Less Returns to Education in Rural Areas
- View Urban Growth Engines as Customers
 - Sell amenities - commuters, retirees
 - Nearby rural regions have an advantage
- Competition/Size Trade-offs in Food Processing
- Sort out Innovation In-house in Rural Areas