Optimal Redistribution in an Open Economy

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Introduction

How should society respond to increasing inequality?

- Conventional view: more redistribution
- This paper: depends on the source of inequality
  - Skill (inceasing dispersion of ability)
  - Globalization (falling trade costs)

Related Literature

- Trade and inequality:
  - Verhoogen (2008), Amiti and Davis (2008)
  - Helpman, Itskhoki and Redding (2010)
- Public finance models with extensive margin:
  - Diamond (1980), Saez (2002)
- Compensation of losers from trade:
  - Dixit and Norman (1980,1986)
  - Spector (2001), Davidson and Matusz (2006), Egger and Kreickemeier (2008)

Outline

1. Economic Environment
2. Closed Economy
3. Open Economy
   - Linear tax system
   - Additional tax instruments
4. Summary

Economic Environment

- Standard Public Finance Setup:
  - Heterogenous agents with productivity $n \sim H(n)$
  - Linear production technology $y_n = nl_n$
- Each worker produces distinct variety:

$$Q = [\int y_n^{\beta} dH(n)]^{1/\beta}, 0 \leq \beta \leq 1$$

- Real revenue of agent n:

$$r_n = Q^{1-\beta} y_n^{\beta}$$

Agent's Problem

- Agent n solves:

$$\mathcal{U}_n = \max_{c,y \geq 0} \mathcal{U}(c, \frac{y}{n})$$

subject to budget constriant:

$$c = r - T(r), where\ r = Q^{1-\beta} y^{\beta}$$

- No income effects in labor supply:

$$\mathcal{U}(c, l) = c - v(l)$$

- Constant labor supply elasticity:

$$v(l) = \frac{1}{\gamma} l^{\gamma} \Longrightarrow \varepsilon = \frac{v'(l)}{l \cdot v''(l)} = \frac{1}{\gamma - 1}$$

Government

- Government maximizes a Social Welfare Function:

$$\max_{T(\cdot)} \int G(\mathcal{U}_n) dH(n)$$

subject to individual optimality and GBC:

$$\int T(r_n) dH(n) \geq 0$$

- Constant relative inequality aversion:

$$G(\mathcal{U}) = \frac{1}{1-\rho} \mathcal{U}^{1-\rho}, \rho \geq 0$$

- Restricted set of tax instruments
  - Linear tax rate: $T(r) = -\Delta + tr, \Delta = tR$
  - Additional tax instruments

Closed Economy

Proposition: the optimal linear tax rate in the closed economy

i. increases in the inequality aversion ρ and in the dispersion of relative revenus exogenously determined by the dispersion of ability;

ii. does not depend on the size of the economy L;

iii. depends ambiguously on the labor supply elasticity ε.

Open Economy

- Source of trade: love for variety ($\beta < 1$)
  - Krugman(1980); Helpman and Krugman (1985)
  - Broda and Weinstein (2006)
- Two symmetric countries
- No tariffs and efficient bargaining about national tax policies
- Variable iceberg trade cost $\tau > 1$
- Fixed costs of trade f_x (Melitz, 2003)
  - Evidence: Bernard-Jensen (2004), Das-Roberts-Tybout (2007) - Alternatives: BEJK (2003); Melitz-Ottaviano (2008)

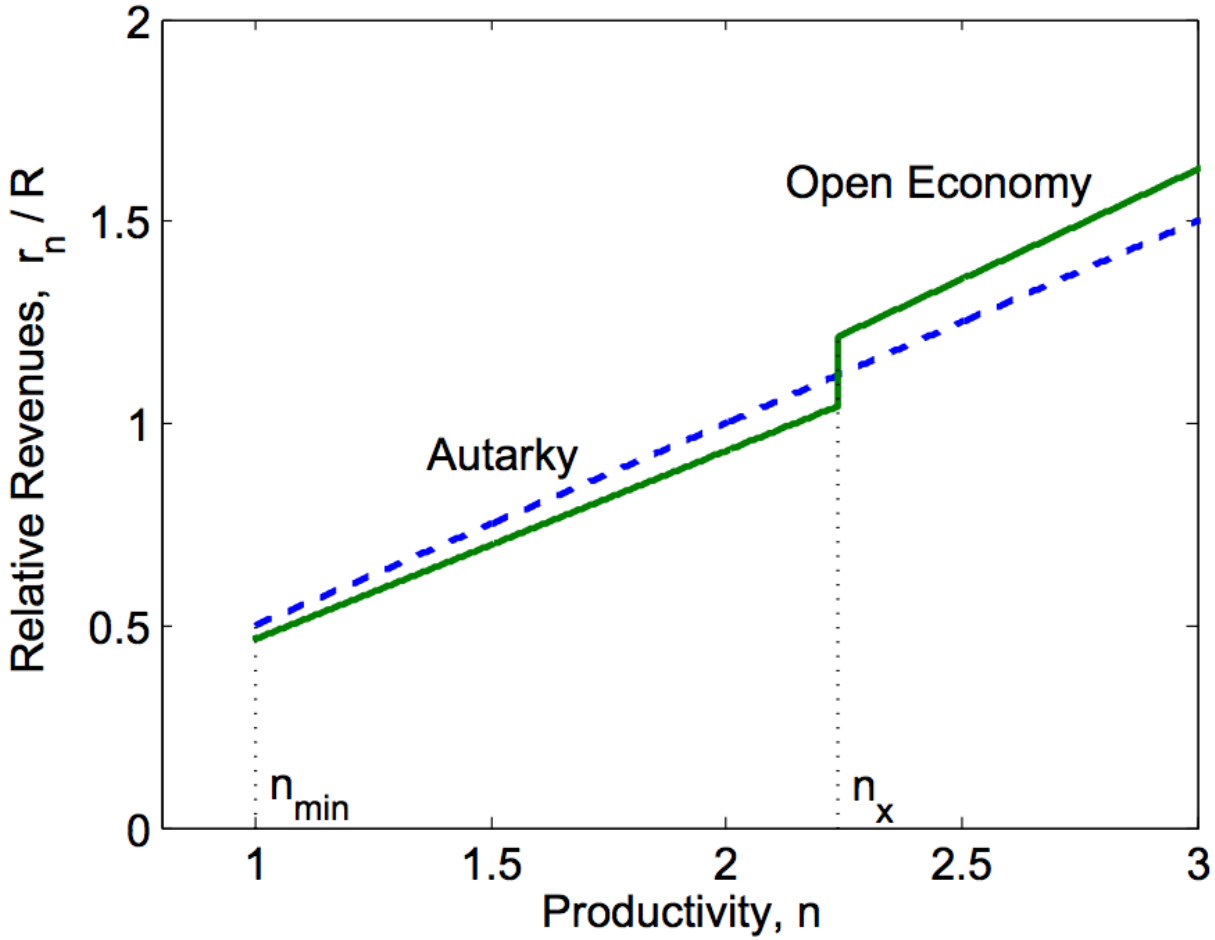
Agent's Problem

- Revenues: $\left(Y_x = 1 + \tau^{-\frac{\beta}{1-\beta}}\right)$

$$r_n = \begin{cases} Q^{1-\beta} y_n^{\beta}, & non-exporter \\ Y_x^{1-\beta} Q^{1-\beta} y_n^{\beta}, & exporter \end{cases}$$

- Consumption: $c_n = \Delta + (1-t) r_n - l_n f_x$
- Utility: $\mathcal{U}_n = \max_{c,y,l_n} \{c - v(y/n)\}$
- Selection: n_x is exporting cutoff
- Result: Trade incvreases inequality of revenus and utilities

Relative Revenues



Equilibrium Properties

Proposition: Holding the tax rate constant,

i. All agents gain from trade, although these gains are not proportionally distributed;

ii. Inequality of relative revenues and utilities is higher in an open economy than in an autarky given that some agents do not export;

iii. Falling trade costs first increase and then decrease inequality.

Optimal Linear Tax Rate

- General optimality condition:

$$\frac{t}{1-t} = \frac{1}{\tilde{\varepsilon}} \cdot \alpha - (1-\beta)(1-\alpha), 0 \leq \alpha \leq 1$$

- Efficiency Margin:

$$\tilde{\varepsilon} \equiv \frac{d \ln Q}{d \ln(1-t)} = \begin{cases} \varepsilon, & \textit{no trade/no selection}, \\ \varepsilon(1+\kappa_x), & \textit{trade with selection} \end{cases}$$

- Inequality Margin:

$$\alpha \equiv \int \frac{G'(\mathcal{U}_n)}{\lambda} \frac{r_n - R}{R} dH(n) = -cov(\frac{G'(\mathcal{U}_n)}{\lambda}, \frac{r}{R}) = -\beta_{\mathcal{U}} \cdot var(\frac{r}{R})$$

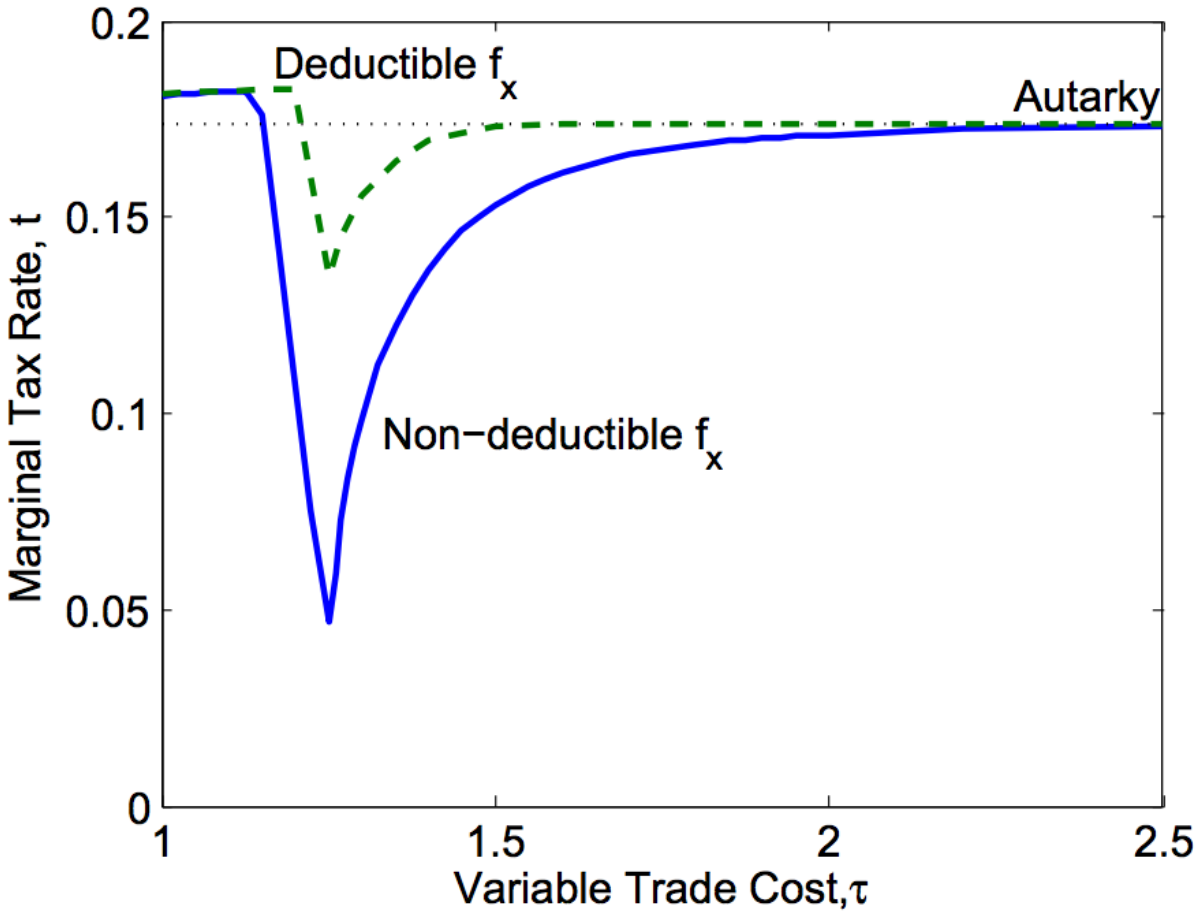
Optimal Redistribution

Proposition: In response to the same increase in inequality, optimal linear tax rate increases by less (or even falls) in the open economy relative to closed economy.

Intuition:

- Inequality Margin still increases in income inequality (variance of relative revenues)
- Efficiency Margin = Intensive Margin + Extensive Margin $> \varepsilon$

Policy Response to Inequality



Additional Tax Instruments

- Natural candidates for additional tax instruments:

  - export market entry subsidy (s)
  - differential tax rates on exporters and non-exporters (t_d, t_x)

Optimal Entry

Proposition

- With no inequality aversion ($\rho = 0$), the first best allocation requires $t_d = t_x = -\frac{1-\beta}{\beta}$ and $s = 0$, i.e., a constant negative marginal tax rate to offset the monopolistic distortion and no entry subsidy.
- Given $t_d = t_x = t$, the optimal entry subsidy is $s^o = f_x \frac{1-\beta(1-t)}{1-\frac{\beta}{\gamma}(1-t)}$.

  Optimal utilitarian subsidy s^o is increasing in t.
- With positive inequality aversion ($\rho > 0$), the optimal subsidy is strictly smaller than s^o given the same level of marginal tax rates t_d and t_x.

Calibration

- Pareto ability distribution with shape parameter 2.2 (Saez 2001)
- Elasticity of substution $= 4$ ($\beta = 3/4$) (BEJK 2003, Broda and Weinstein 2006)
- Labor supply elasticity $\varepsilon = 1/2$ (Tuomala 1990 and Saez 2002)
- Inequality aversion $\rho = 2$ (Saez 2002)
- Fixed trade cost f_x such that 40% of output is produced by exporting agents and exports account for 15% consumption
- Iceberg cost $\tau = 1.5$ (Anderson and van Wincoop 2004)

Optimal Entry

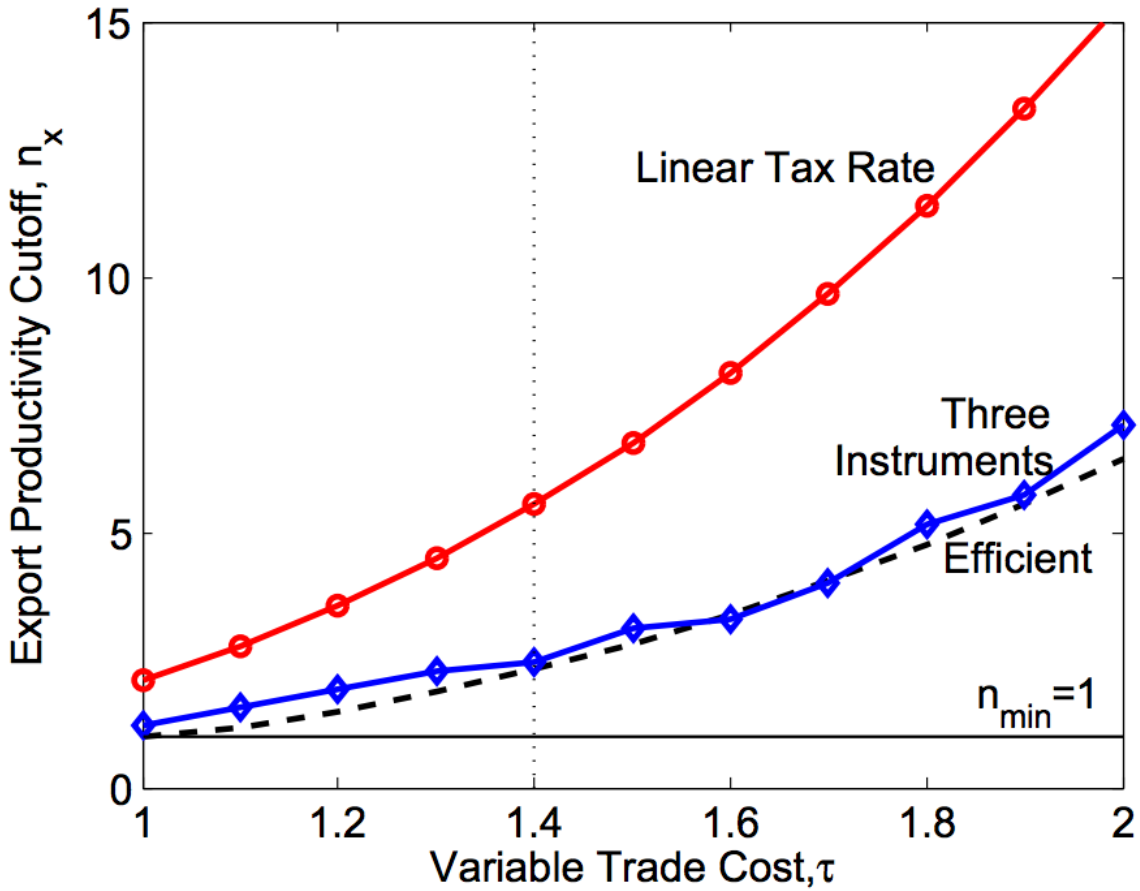


Figure: Optimal Entry, n_x

Marginal Tax Rates

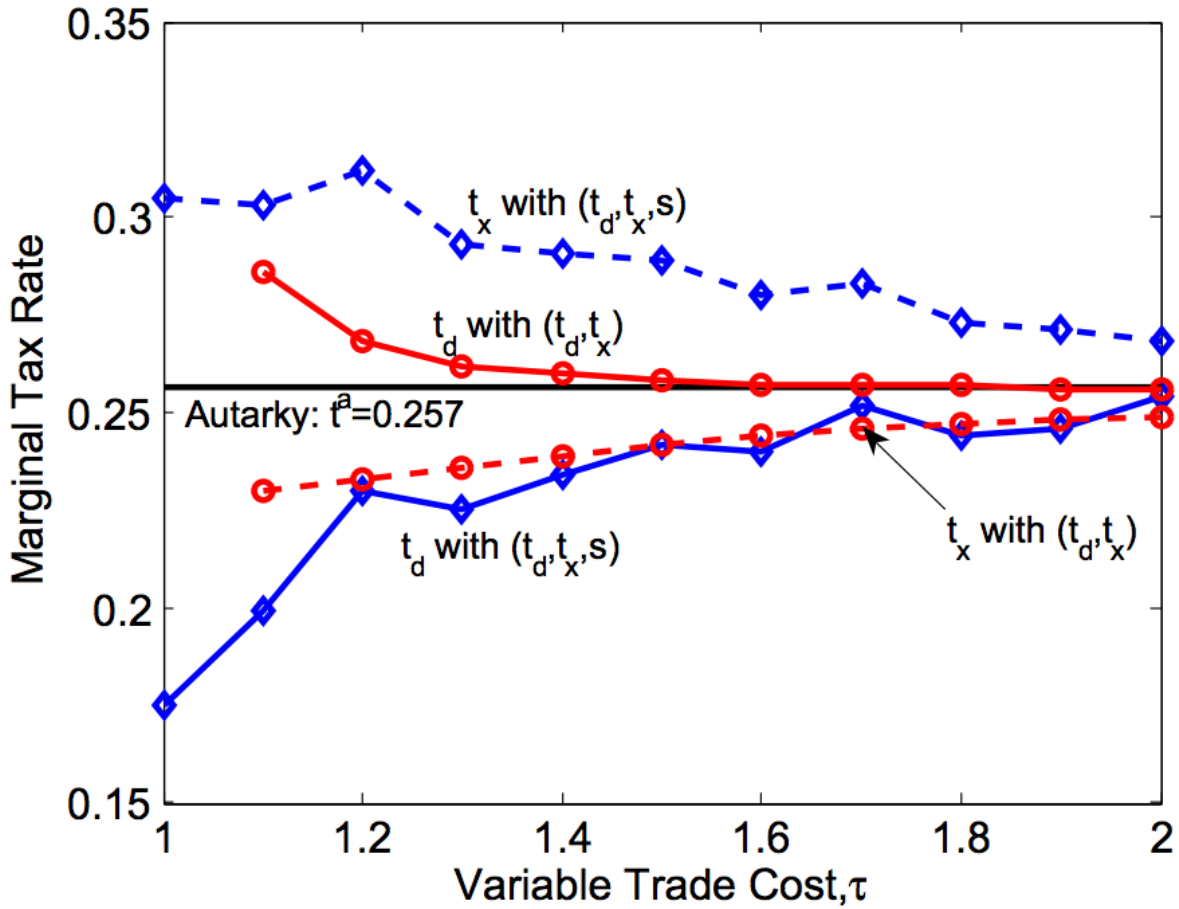


Figure: Optimal Marginal Tax Rates, t_d and t_x

Inequality Outcome

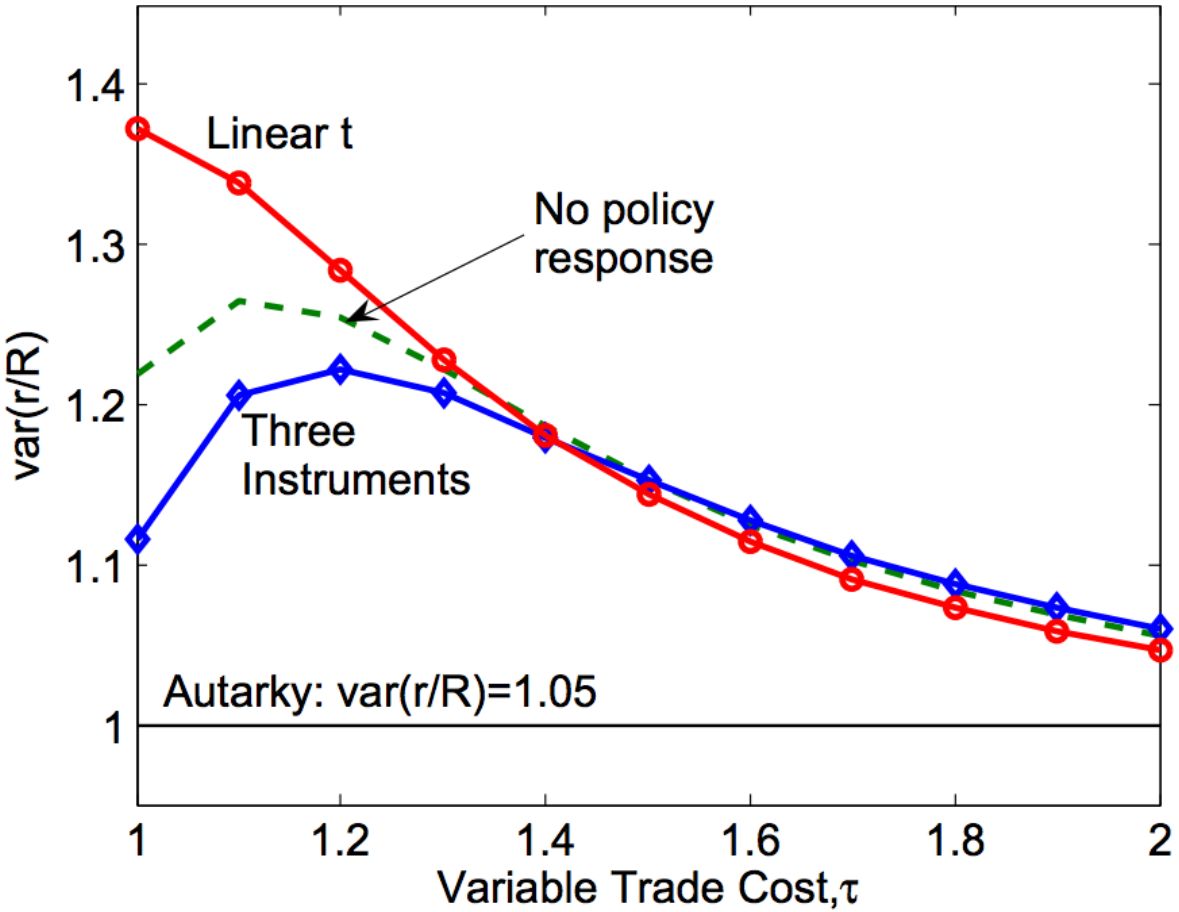


Figure: Inequality of Relative Revenues, $\mathrm{var}(r/R)$

Summary

- Trade intensifies both inequality and efficiency margins through selection into exporting (extensive margin of trade)
- An optimal tax system should balance equity, efficiency and, in particular, entry decisions
- Negative marginal tax rates for agents at the threshold
- Greater ineuqlity may be a necessary outcome to reap the most gains from trade