Vertical Differentiation and Credence Goods: Harmonized Labeling and Gains from International Integration

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Motivation

- **Goods increasingly differentiated by process attributes**

- **Consumers unable to verify claims about attributes, i.e., a form of *credence good* (Darby and Karni, 1973)**

- **Labeling possible, but there are implementation issues:**

  - **discrete vs. continuous labels**

  - **voluntary vs. mandatory**

  - **exclusive vs. non-exclusive**

  - **harmonized vs. mutual recognition**

- **Examine trade implications of choices in context of model of *vertical* product differentiation**

Model

■ *Consumers, firms and quality*

- consumers have unit demand for quality-differentiated good, consumer utility, $U = u(y - p)$, $u \in [\underline{u}, \infty]$ and $\underline{u} > 0$

- income uniformly distributed on interval $[a,b]$, size of population is s

- firms produce single differentiated good with zero production costs and a fixed, quality-dependent cost, $F(u)$, sunk by firm after entry, $F(u) = \varepsilon + \alpha(u - \underline{u})^2$, ε and $\alpha > 0$

■ *Game structure*

- 3-stage game: (1) entry/no-entry; (2) choice of quality; (3) price

- invoke sub-game perfection and Bertrand-Nash competition

■ *Entry and number of firms*

- assume $4a > b > 2a$ or $b/4 < a < b/2$, ensuring *covered* market of 2 firms with quality levels $0 < \underline{u} \leq u_1 < u_2$

- if more than 2 firms enter, all firms produce top-quality at a zero price, earning zero profits, so with sunk costs ε, only two firms can enter and make a profit in equilibrium
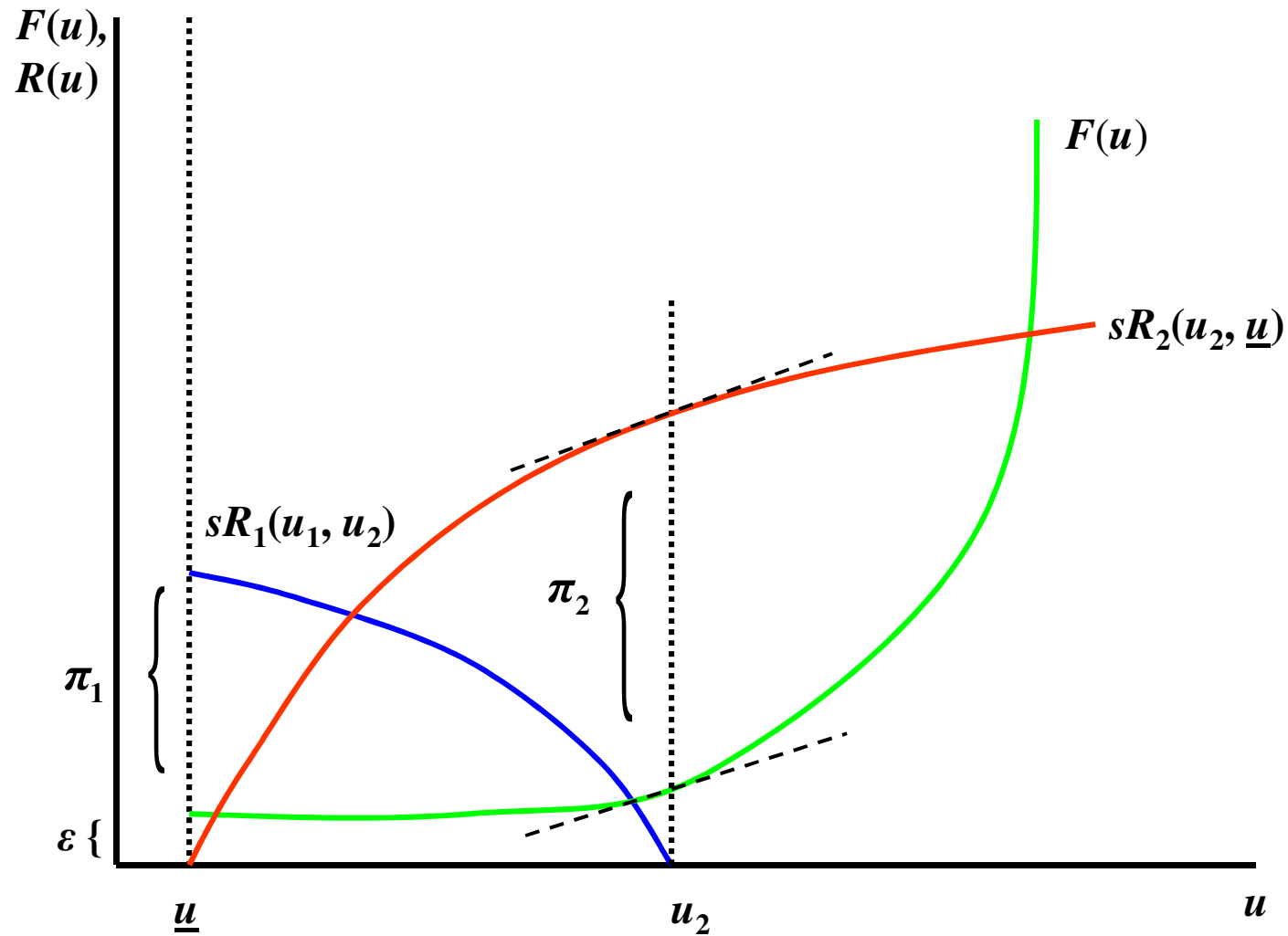
■ *Labeling policy*

- private and public certifiers perfectly monitor and communicate quality of individual firms *ex ante*, continuous labeling more costly than discrete

■ *Autarky equilibrium with perfect information*

- equilibrium shown in Figure 1, firm 1 picks $\underline{u}$ and firm 2 picks u_2

Figure 1: Autarky equilibrium with perfect information

North-North Integrated Equilibrium

■ *Perfect information (PI)*

- two economies with same distribution of income integrate, $a_1 = a_2$ and $b_1 = b_2$, although may be of differing sizes, i.e., $s^i = s_1 + s_2$

- firms incur additional sunk costs to enter integrated market

- economy supports 2 firms, i.e., 2 firms have to exit, figure 2

- increase in quality of good 2, quality of good 1 remaining the same

■ *Trade with no labeling (NL)*

- sunk cost of entry combined with 3-stage game supports entry of single firm into integrated market producing lowest quality

- price is monopoly outcome given linear demand structure due to assumptions on income distribution

Figure 2: North-North trade equilibrium – *PI* case
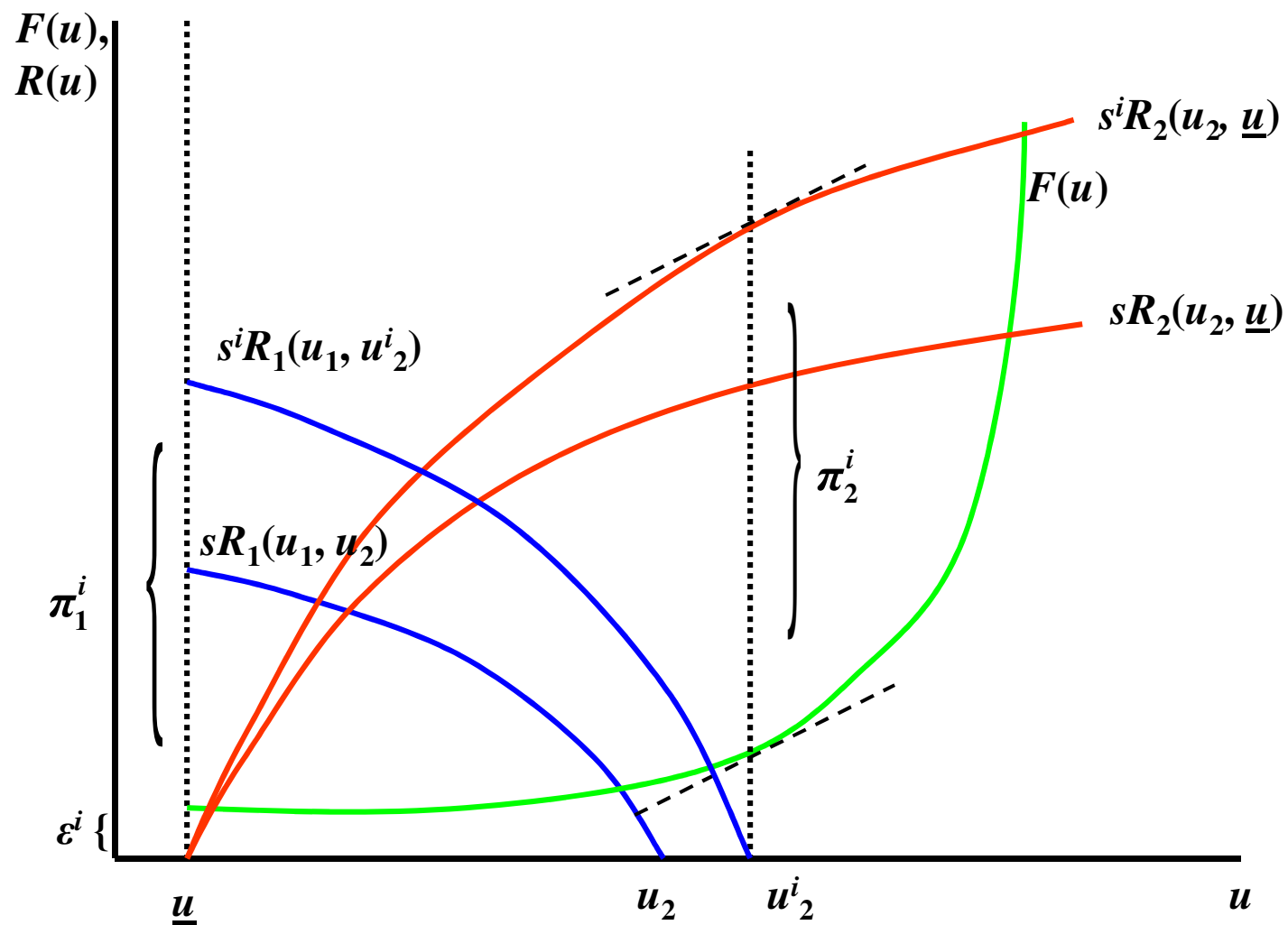
Table 1: Labeling regimes – North/North trade

	MNC	VND	MED	MND
Harmonized	Replicates PI	Replicates PI	May be NL (Figure 3)	Replicates PI
Mutual recognition	Replicates PI	Replicates PI	May replicate PI	Replicates PI

PI – perfect information
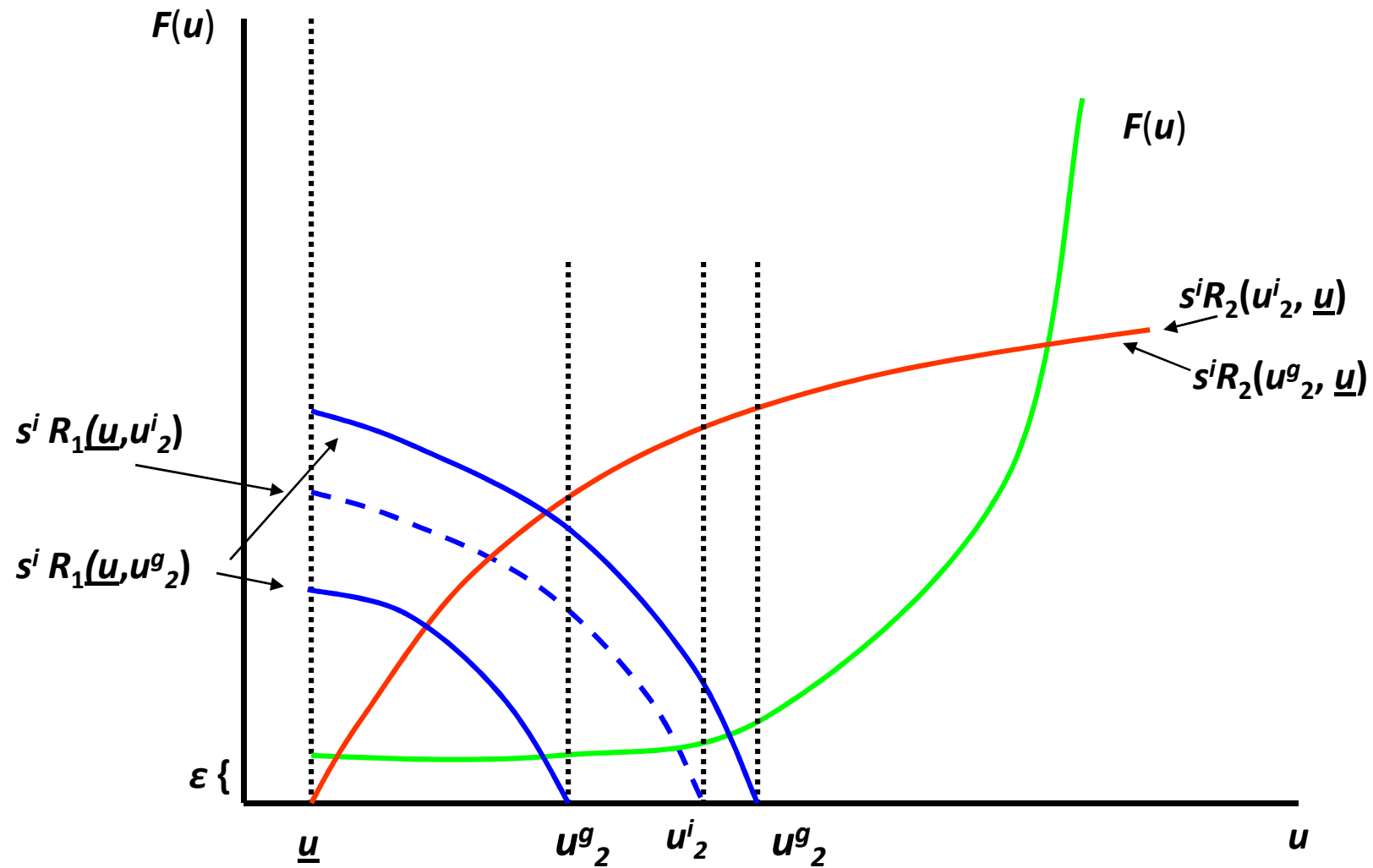
NL – no labeling

MNC – mandatory, non-exclusive, continuous

VND – voluntary, non-exclusive, discrete

MED – mandatory, exclusive, discrete

MND – mandatory, non-exclusive, discrete

Figure 3: Harmonized – *MED* case

North-South Integrated Equilibrium

■ *Trade equilibrium with overlapping income distributions*

- if two economies initially support two goods using same technology, but $a_1 > a_2$, and $b_1 > b_2$, there will be three goods in integrated equilibrium if, $a_1/2 < a_2 < a_1 < b_1/2 < b_2 < b_1$

- gains from trade occur due to lower prices in equilibrium

- *NL* generates monopoly outcome

- harmonized/mutual recognition *MNC*, *VND*, *MND*, replicate *PI*

- harmonized *MED*, one or two firms may be forced from market in equilibrium, but not necessarily with mutual recognition