Lecture XXX:Gains to Research and Development

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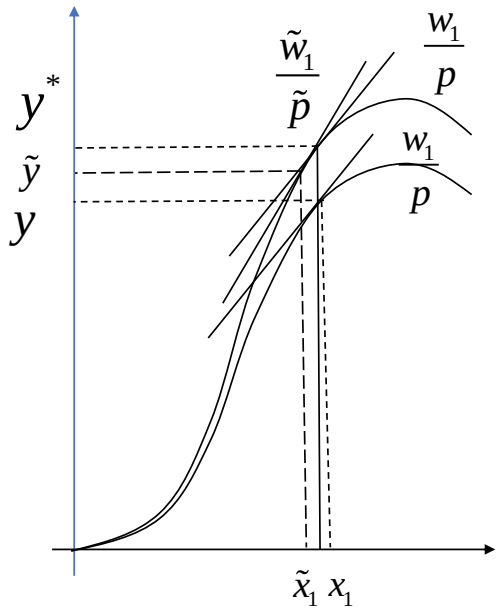
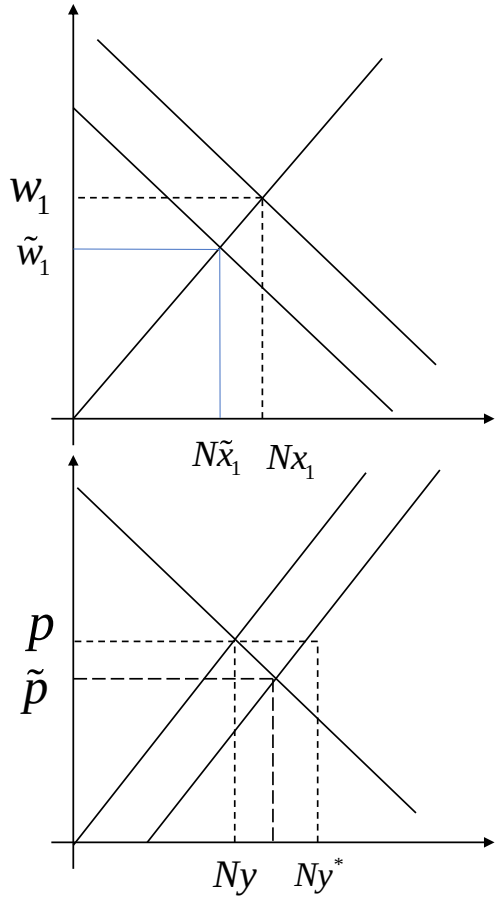
Technical Change

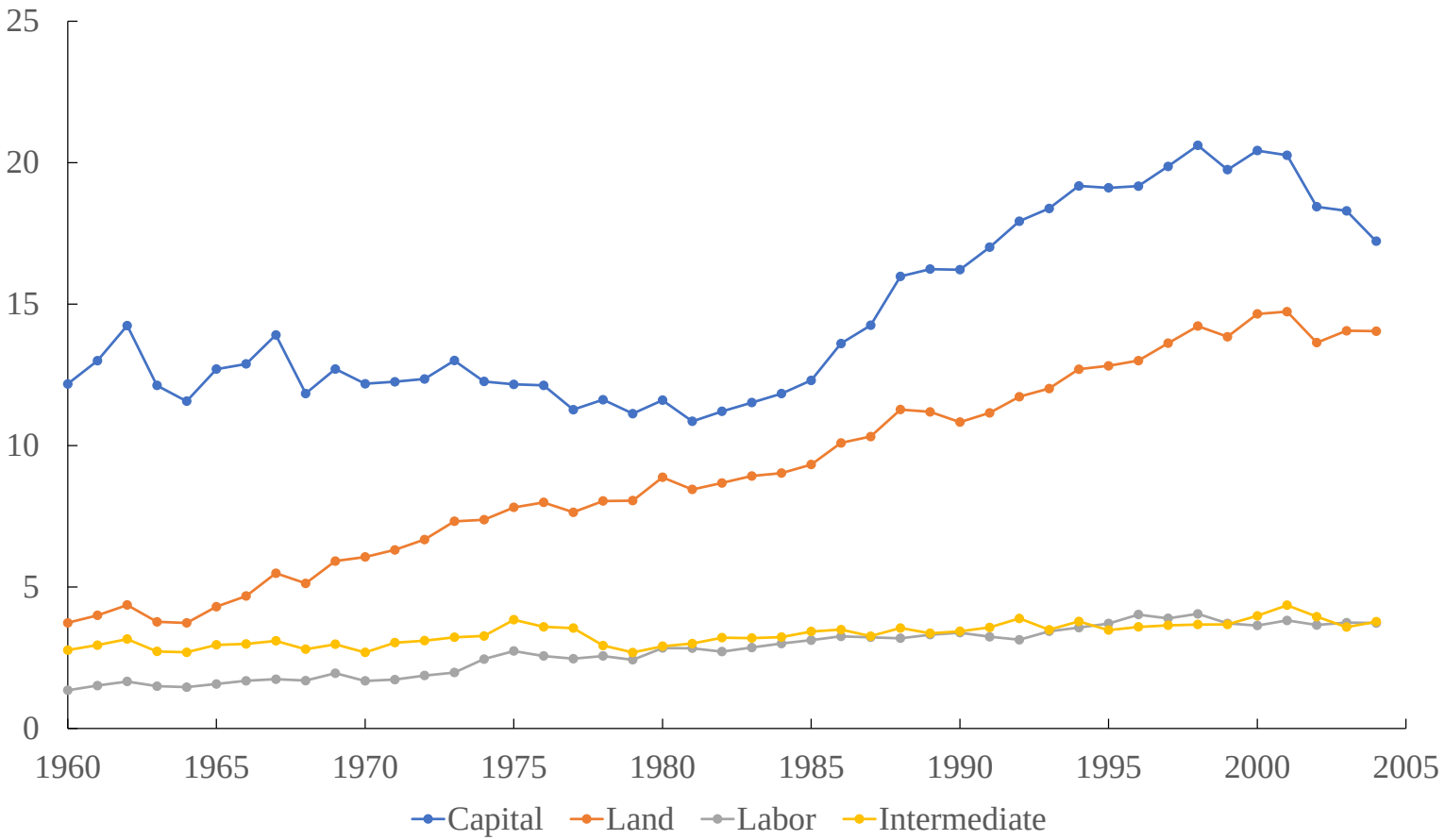




Florida Inputs

	Ouput		Capital		Land		Labor		Intermediate	
Year	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity	Price	Quantity
1960	0.3198	2747163	0.1533	225574	0.0411	735878	0.0751	2036348	0.2968	991338
1961	0.3297	2964054	0.1474	228067	0.0304	741193	0.0857	1954380	0.2986	1006769
1962	0.3123	3290221	0.1518	231053	0.0370	753648	0.0870	1983156	0.3066	1041086
1963	0.3572	2888328	0.1535	238218	0.0368	766366	0.0936	1933948	0.3147	1060416
1964	0.3901	2880245	0.1643	249016	0.0501	772341	0.1055	1972780	0.3154	1069334
1965	0.3426	3298316	0.1660	259702	0.0527	766236	0.1092	2097778	0.3196	1115420
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
1990	1.0567	5792774	0.9312	357235	1.4377	534919	0.7291	1710964	1.1750	1686329
1991	1.1067	5955666	0.9332	350081	1.3828	533891	0.6438	1837945	1.2125	1667723
1992	1.0652	6249869	0.9284	348541	1.3239	533031	0.5625	1992584	1.1955	1606528
1993	1.0314	6387675	0.9446	347522	1.3254	531586	0.6817	1859787	1.2200	1831791
1994	0.9813	6723064	0.9829	350564	1.3560	529503	0.6284	1885088	1.2472	1776405
1995	0.9824	6753211	1.0182	353405	1.4180	526897	0.7070	1820530	1.2311	1942705
1996	1.0398	6811128	1.0081	355302	1.4591	523850	0.8688	1691104	1.3136	1897938
1997	1.0196	7087589	1.0239	356749	1.5265	520460	0.7539	1821013	1.2782	1944621
1998	1.0712	7349998	1.0359	356654	1.4883	516777	0.7778	1813908	1.2785	2000694
1999	1.0273	7099831	1.0992	359460	1.6914	512761	0.6899	1911266	1.2397	1929910
2000	1.0044	7449302	1.1676	364668	1.8630	508366	0.6674	2046578	1.2416	1871465
2001	0.9962	7419773	1.1564	366230	1.7811	503559	0.8434	1943531	1.3432	1702719
2002	1.0320	6796861	1.1259	368571	1.6411	498377	0.9251	1858198	1.4118	1719396
2003	1.0656	6928615	1.1226	378704	1.6340	492920	0.8021	1851801	1.3928	1934043
2004	1.1200	6842724	1.1021	397278	1.4339	487206	1.0300	1835234	1.4664	1813550

Average Product Over Time



Simple Time Trend

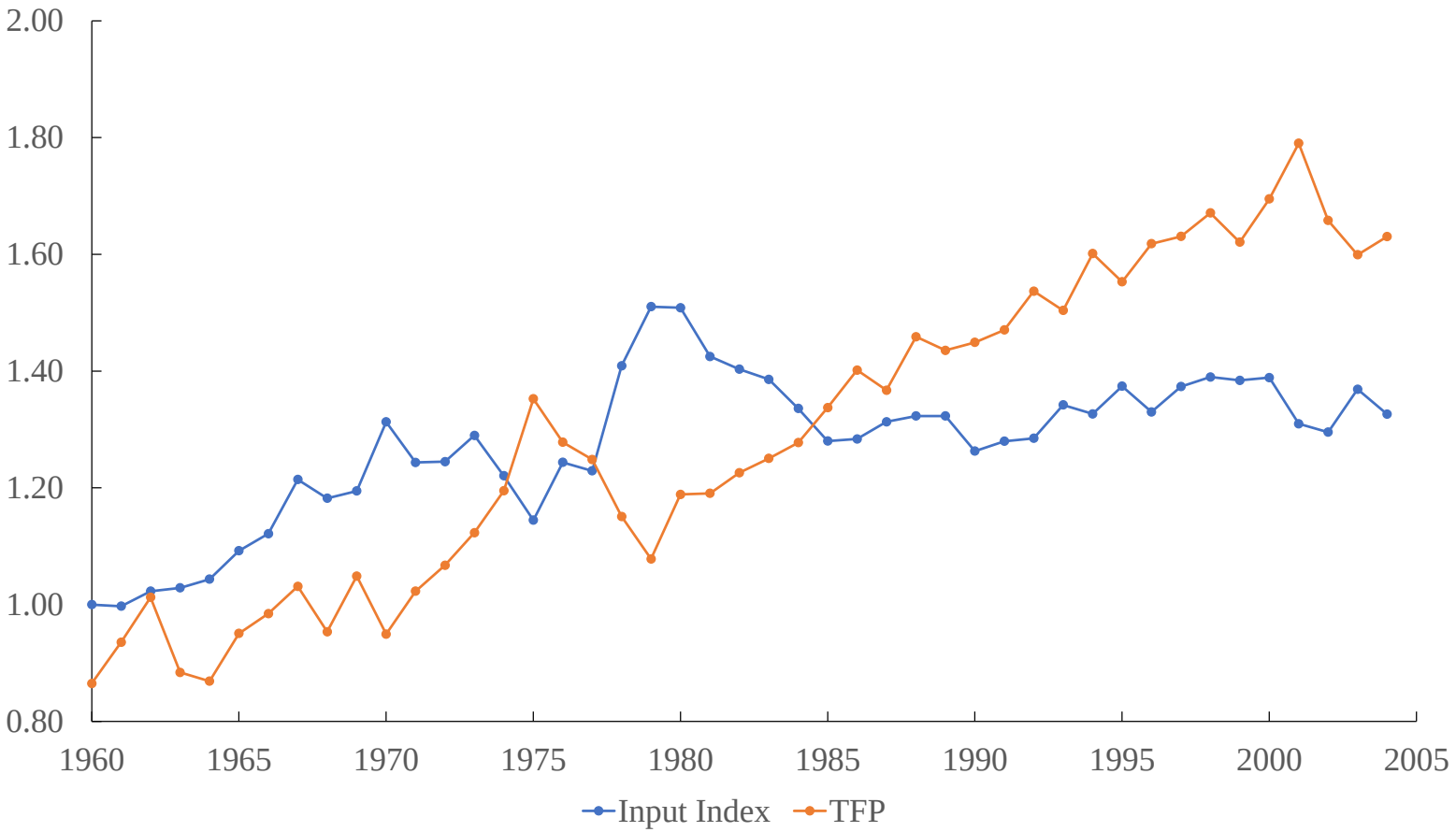
Coefficient	Capital	Labor
Constant	-375.232	-121.069
	(44.851)	(4.673)
Year	0.197	0.062
	(0.023)	(0.002)

Tornqvist - Theil

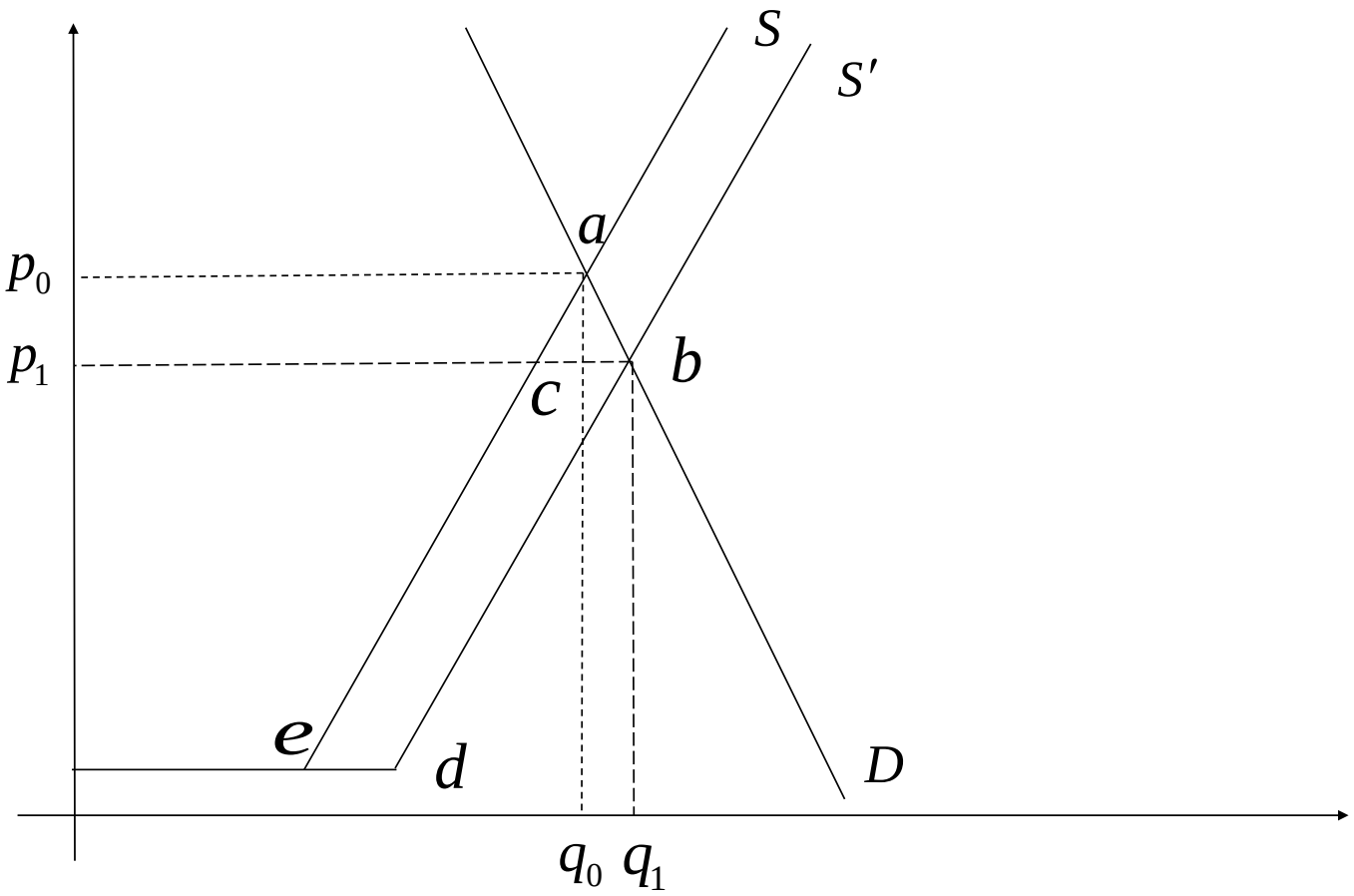
- These are "partial" measures of productivity. Several approaches exist to measure "total" productivity.
- Tornqvist – Theil

$$dQ_I = \sum_{i=1}^{4} \frac{s_{it} + s_{it-1}}{2} \ln\left(\frac{x_{it}}{x_{it-1}}\right) \tag{1}$$

TFP for Florida



Gaines to Technical Change

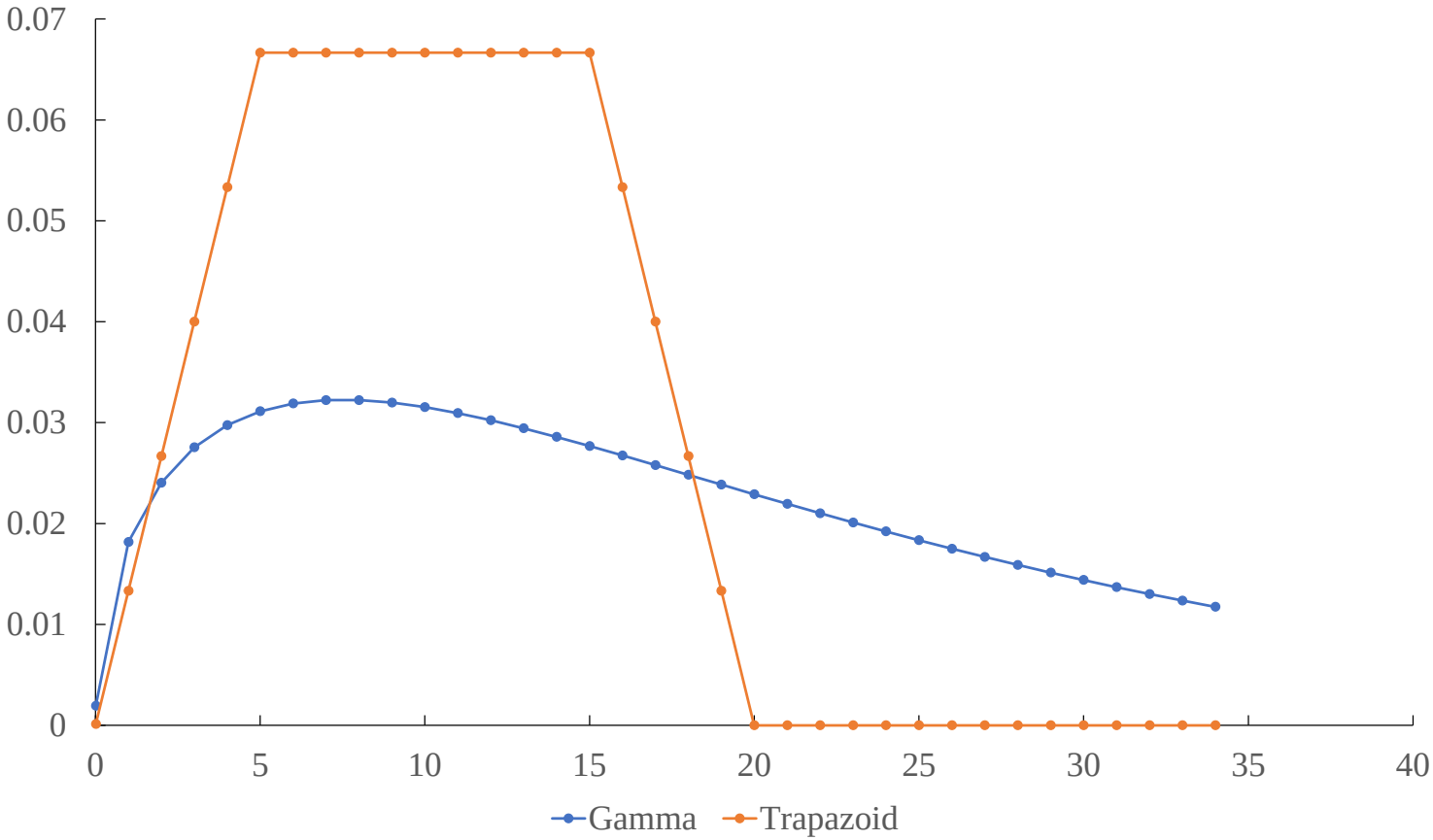


Cost–Benefit Analysis

- Going back to our welfare analysis:
  - The gain in producer welfare is $cbde - p_0acp_1$.
  - The gain in consumer surplus is p_0abp_1.
- What is the costs?
- Typically, we think that either the government invests in developing the technology or a private entity makes the investment.
- The return to private investment is captured through higher profits – increased prices on inputs.
- Benefit/Cost Analysis

$$BC = \frac{\sum_{i=1}^{n} \frac{cbde - p_0acp_1 + p_0abp_1}{(1+r)^i}}{\sum_{i=1}^{n} \frac{I_i}{(1+r)^i}} \tag{2}$$

Investment Stock



Florida Research Stock – Phony