Empirical test of the neo-technological approach

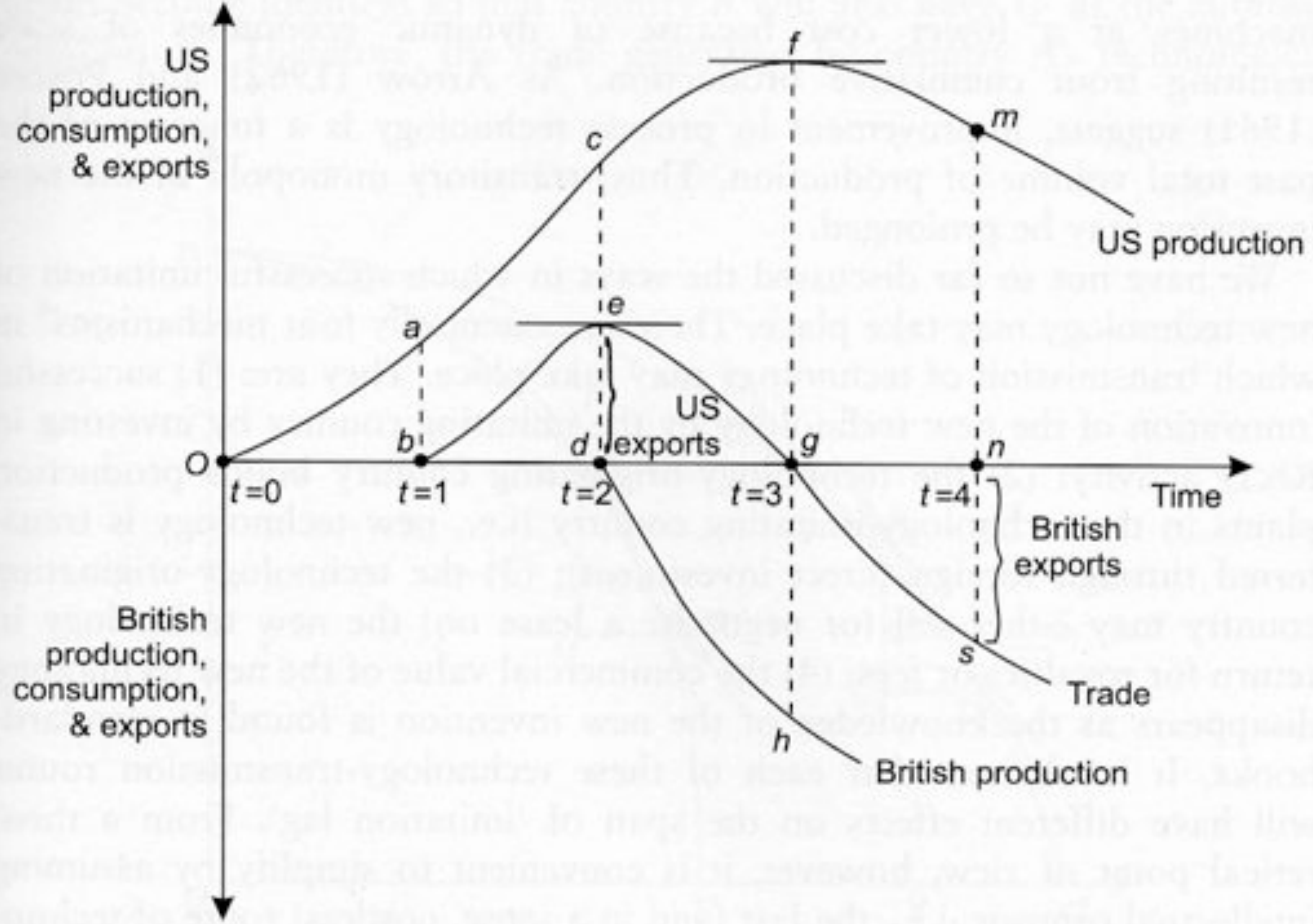
Leads e Lags

Hufbauer (1966), Hirsh (1965 e 1967)

They analise innovation lead and lag in synthetic material industry (rubber, nailon etc.)

E.g.: galalite (a synthetic material produced from milk protein and used in button production)

Introduced in Germany in 1900 e then produced in France and Uk (1912)



US production, consumption, & exports
British production, consumption, & exports
f
c
m
US production
a
e
US exports
b
d
g
n
O
t =0
t =1
t =2
t =3
t =4
Time
British exports
s
Trade
h
British production

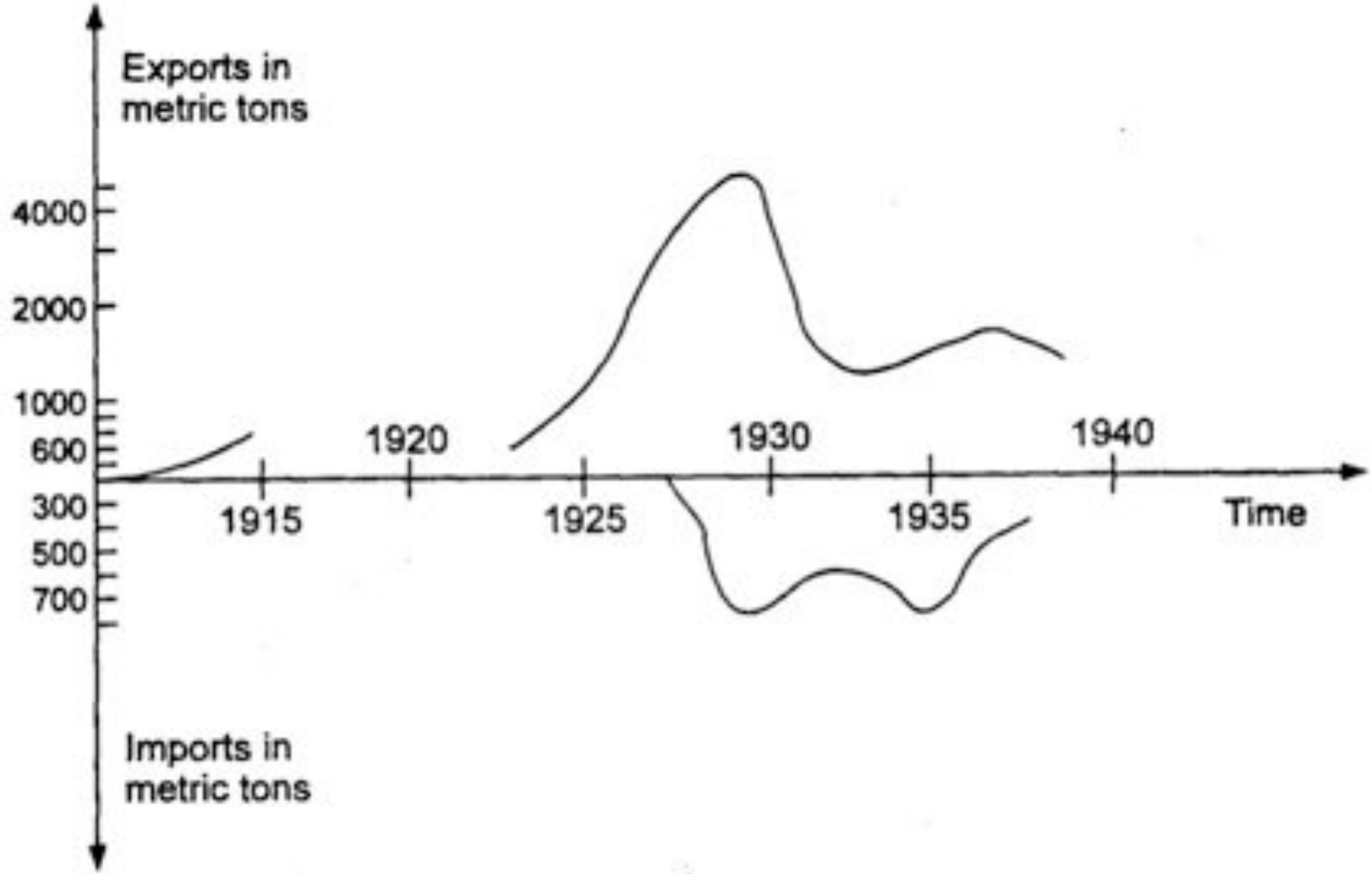

Exports in
metric tons
4000
2000
1000
600
300
500
700
Imports in
metric tons
1915
1920
1925
1930
1935
1940
Time

Figure 22.1

Product life-cycle

Wells (1969)

finds that exports of high income goods grow faster than low income goods

He uses two indexes:

1) income elasticity of demand

2) share of households owning a specific good (20 goods). The index is a proxy for market saturation

In the Usa goods with low market diffusion (low saturation) have the highest income elasticity

Wells estimates the following equation in which E represents income elasticity, S market saturation and R the ratio between average exports in periods 1962-3 and 1952-3:

$$R = c + \beta_1 E + \beta_2 S$$

$$R = 0.78 + \underset{(8.64)^{**}}{3.17E} \qquad R^2 = 0.80 \quad F = 74.5$$

$$R = 1.40 + \underset{(4.18)^{**}}{2.79E} - \underset{(0.70)}{0.72S} \qquad R^2 = 0.80 \quad F = 36.3$$

The figures in parentheses are *t*-values.
** Significant at the 1% level.

The Soete test on patents

Soete takes patents as a measure of innovation output

He uses US patents data

He estimates 40 cross-country regressions of the type
{22 OECD countries with 40 industries}

$$\ln SX_{ij} = \beta_{0j} + \beta_{1j} \ln SP_{ij} + \beta_{2j} \ln K_i + \beta_{3j} \ln PL_i + \beta_{4j} D_j + u_{ij}$$

- SX= export share of country i in good market j;
- SP= patent share of a country i in a industry j;
- K= capital-labour ratio;
- D= “distance” from the world “center”;
- PL= population

Table 22.1 *Selected econometric results from the Soete test*

Types of good	Sectors[1]	Independent variables						
		Const.	$\ln SP_{ij}$	$\ln k_t$	$\ln P_t$	D_t	R^2	F
'Ricardian' goods	Food products	5.01	0.099	0.402	0.368	0.004	0.32	3.5
		(1.86)	(0.67)	(0.68)	(1.44)	(1.33)		
	Petroleum, natural gas	3.22	−0.151	3.561	1.071	0.009	0.36	4.0
		(0.41)	(-0.42)	(2.61)*	(1.30)	(1.13)		
'Heckscher–Ohlin' goods	Textile-mill products	−12.90	0.145	−0.337	0.631	0.003	0.78	19.5**
		(5.89)**	(1.24)	(−0.612)	(2.74)*	(1.00)		
	Paints and allied products	−0.07	0.214	1.585	0.478	0.010	0.68	12.2**
		(−0.02)	(1.30)	(2.95)**	(1.41)	(2.50)*		
'Product Life Cycle' goods	Plastic materials, synthetics	−2.55	0.305	1.148	0.544	0.008	0.91	51.2**
		(−1.28)	(3.11)**	(2.41)*	(2.31)	(4.00)**		
	Household appliances	−4.68	0.501	0.109	0.184	0.004	0.78	20.1**
		(−1.90)	(3.80)**	(0.18)	(0.74)	(1.33)		
	Communications eq.& electronic components and accessories	−8.29	0.463	0.009	0.499	0.010	0.80	22.4**
		(−4.00)	(2.69)*	(0.01)	(1.45)	(3.33)**		
	Motor vehicles & equipment	−9.45	0.456	0.732	1.027	0.007	0.86	32.9**
		(−3.28)	(2.81)*	(1.01)	(3.31)**	(2.33)*		
	Aircrafts and parts	1.09	1.262	−0.206	−0.307	0.009	0.81	22.7**
		(0.24)	(5.21)**	(−0.23)	(−0.68)	(1.80)		

The figures in parentheses are t-values.
**,* Significant respectively at the 1% and 5% levels.
[1] See note 5 for an explanation of the categorisation used.
Source: Soete (1981).

“First date” test

Hufbauer (1970) uses the date in which a good appears for the first time in the market

More technologically advanced countries should export goods at their early development stage.

Pro-capita GDP is a proxy for technological level of the country

He computes the correlation between data rank and pro-capita GDP finding an average value of 0,698 (24 countries)

“First date” test

Branson e Junz (1971) estimate the following regression

$$\left(X - M\right) = \beta_0 + \beta_1 \frac{K}{L} + \beta_2 \frac{H}{L} + \beta_3 SI + \beta_4 N$$

H is human capital, SI economies of scale and N is the date of introduction of a good in the market (first date)

$$(X - M) = -9.24K/L + 95.13H/L + 4.26SI + 9.29N$$
$$\qquad\qquad (-2.5)^{**} \quad (3.1)^{**} \quad (1.4) \quad (2.0)^{*}$$

$R^2 = 0.19 \quad F = 5.86 \quad n = 101$

The figures in parentheses are the *t*-values.
*,** Significant at the 5% and 1% levels respectively.

R&D Test

Lowinger (1974) measure “innovation” efforts using R&D statistics

He takes US data for 16 industries at the 2 and 3 digit SITC classification level

He estimate the regression

$$ES = \beta_0 + \beta_1 R\&D + \beta_2 H + \beta_3 F$$

R&D is the number of scientists employed in research and development activity, H is human capital, F represents average tariffs on exports (trade barriers)

Table 22.2 *Selected econometric results from the Lowinger test*

	Dependent variable	Independent variables				
		Const.	R&D	H	F	R^2
(1)	*ES*	0.078 (2.98)**	0.054 (6.46)**			
(2)	*ES*	−0.070 (1.67)	0.055 (7.54)**	0.329 (2.42)*		0.80
(3)	*ES*	−0.037 (0.54)	0.054 (8.86)**	0.436 (3.31)**	−0.009 (2.56)*	0.87
(4)	*ES*	0.230 (5.65)**	0.058 (10.19)**		−0.010 (2.84)**	0.89

The figures in parentheses are *t*-values.
*,** Significant at the 5% and 1% levels respectively.
Source: Lowinger (1975).