# "DEMAND" ON AN INFORMATION ECONOMY IN UKRAINE

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Information economics means the sectors and industries that have extremely rapid productivity growth driven by the enormous and ongoing technological revolutions in data processing and data communications. The question is: will it have importance in future? Will this wave of innovation and technological development have consequences similar to the trio of steam power, metal forging, and automatic machinery? Or will it turn out to have a much smaller impact on long-run economic growth as previous leading sectors did?

The analytics of the effect of a leading sector on overall productivity growth is simple and straightforward. If total factor productivity growth in the rest of the economy is growing at a rate $\pi R$, and if total factor productivity in the leading industries and sectors is growing at a faster rate $\pi L$, then total factor productivity growth in the economy as a whole will be equal to:

$$\pi = \sigma(\pi L) + (1-\sigma)(\pi R) \qquad (1)$$

where $\sigma$ is the share of total expenditure on the goods produced by the economy's fast-growing technologically-dynamic leading sectors. As the process of innovation and technological revolution in the leading sectors proceeds, we would not expect the leading sector share $\sigma$ of total expenditure to remain constant. If the goods produced by the leading sectors are superior (or inferior) goods, the share $\sigma$ will rise (or fall) as economic growth continues: only if the income elasticity of demand $\varepsilon I$ for its products is one will changes in the overall level of prosperity leave the leading sector share unchanged. If the goods produced by the leading sector have a high (or low) price elasticity of demand, the falls over time in their relative prices will boost (or reduce) the share of total expenditure $\sigma$: only if the price elasticity of demand $\varepsilon P$ is one will the fall in the relative price of leading sector products produced by the technological revolutions leave the leading sector share unchanged.

To assess the aggregate economic impact of an explosion of invention and innovation in a leading sector we need thus five pieces of information:

- The initial share of expenditure on the leading sector's products, $\sigma 0$
- The magnitude of the relative pace of cost reduction, $\pi L - \pi R$ , during the leading sector's heroic age of invention and innovation.
- The duration of the leading sector's heroic age of invention and innovation.
- The income elasticity of demand $\varepsilon I$ for the leading sector's products.
- The price elasticity of demand $\varepsilon P$ for the leading sector's products.

To gain a sense of the importance of these factors, we have to consider a few simulations with sample parameter values.

So with a price elasticity of demand of 0.5, by the twelfth year the expenditure share on leading sector products has fallen below 1.5%. By the twenty-eighth year it has fallen below 1.0%. By the fortieth year the expenditure share has fallen to 0.7%.

Rapid productivity growth in the leading sector has next to no effect on productivity growth in the economy as a whole. This is Baumol and Bowen' (1966) "cost disease" scenario: innovations become less and less important because the innovation-resistant share of the economy rises over time. Indeed, as time passes the rate of aggregate growth converges to the rate of growth in the productivity-resistant rest of the economy.

With a price elasticity of 4 the expenditure share of the leading sectors grow rapidly. With a productivity growth wedge of 5% per year, the leading sector share of spending surpasses 10% by year 12, 30% by year 20, and reaches 89% by year 40.

In these simulations, there is only one reason for the sharp difference in the effects of innovation in the leading sector: the different price elasticities of demand for leading-sector products in the two scenarios. When demand for leading sector products is price-elastic, each advance in technology and reduction in the leading sector's costs raises the domination of the leading sector in the economy and thus brings the proportional rate of growth of the aggregate economy closer to the rate of growth in the leading sector itself. This is the "economic revolution" scenario: not only does productivity growth accelerate substantially and material welfare increase, but the structure of the economy is transformed as the bulk of the labor force shifts into producing leading-sector products and the bulk of final demand shifts into consuming leading-sector products.

What determines whether demand for a leading sector's products is price-inelastic—in which case we are in Baumol and Bowen's "cost disease" scenario in which technological progress in the leading sector barely affects the aggregate economy at all—or price-elastic—in which case we are in the "economic revolution" scenario, and everything is transformed? The more are high-tech products seen as "luxury" goods, and the greater is the number of different uses found for high-tech products as their prices decline, the larger will be the income and price elasticities of demand--and thus the stronger will be the forces pushing the expenditure share up, not down, as technological advance continues.

***References***

1. *How Important Will the Information Economy Be: Some Simple Analytics, J. Bradford DeLong University of California at Berkeley and NBER, Lawrence H. Summers, Harvard University August 2001*.