

## On the pricing policy in environments with unbalanced economies.

*An approach to the Diffusion Law (PART TWO – Continued from September 2014 Issue of Marketing Canada)*

*Vicente González-Prida, Department of Industrial Management, University of Seville, Spain.  
Anthony Raman, Councilor – Canadian Institute of Marketing, New Zealand*

### THE GAP ON PRICES AND SIMILARITIES TO THE DIFFUSION LAW

Analyzing the price differences of some products in the Eurozone, we obtain the figures shown in Table 1. This table shows the highest and lowest prices for the same electronic product in the year 2001, considering 100 EUR as the EU average price.

| Electronic devices   | Price min. (€) |    | Price max. (€) |     |
|----------------------|----------------|----|----------------|-----|
| <b>Camcorder</b>     | Austria        | 86 | France         | 116 |
| <b>CD player</b>     | Germany        | 79 | Spain          | 123 |
| <b>DVD player</b>    | Germany        | 84 | Spain          | 111 |
| <b>Video Desktop</b> | Italy          | 89 | France         | 115 |
| <b>CD player</b>     | Italy          | 88 | Austria        | 112 |

*Table 1 Prices comparison in the EU<sup>1</sup>*

The result shows that the same product models and brand may have a variation up to 56% in price. An interesting future research may be to observe how these prices have evolved after more than a decade of using the same currency. Some studies consider that the use of the same currency inevitably leads to lower price levels in the future<sup>2</sup>. That means there is a realistic risk of ending up in price levels lower than the present ones. In these circumstances, manufacturers

<sup>1</sup> [www.europa.eu](http://www.europa.eu)

<sup>2</sup> [www.newsoffice.mit.edu](http://www.newsoffice.mit.edu)

may try to avoid it trying to reach an intermediate point, i.e., a price level positioned between the highest price country and the lowest price country.

This situation is similar to the physical behavior explained by the law of diffusion or Fick's law, which can be expressed as follows<sup>3</sup>:

$$j = -D (c_2 - c_1) \quad (3)$$

According to Fick's law,  $j$  is the flow of a particular substance,  $D$  is the diffusion coefficient and the gradient  $(c_2 - c_1)$  is the concentration difference between two spaces of the same area. Let's assume that a higher or lower price is equivalent to a higher or lower concentration of a given magnitude (in our case, monetary unit) on the same product. Then, according to this analogy, the "price flow" will move in the opposite direction of the price gradient, i.e.:

$$j = -D [p(s_2, t) - p(s_1, t)] \quad (4)$$

Where  $s_1$  and  $s_2$  refers to different countries or regions within the same free trade area.

Applying a similar mathematical development to obtain Fick's second law, we can consider also a volume  $V$  constant, which refers in our approach to a free trade area also constant:

$$\frac{\partial}{\partial t} \int_V p \, dV = - \int_{\partial V} j \, ds \quad (5)$$

Similarly, applying the Stoke theorem and replacing  $j$  by equation (4), our version of Fick's second law applied to prices yields as follows:

$$\frac{\partial p}{\partial t} + \nabla j = \frac{\partial p}{\partial t} - D \nabla^2 p = 0 \quad (6)$$

That is:

$$\frac{\partial p}{\partial t} - D \frac{\partial^2 p}{\partial s^2} = 0 \quad (7)$$

In other words, this theoretical exercise is intended to show that, in case of existing price differences of any product in a constant free trade area, the random flow of the monetary value

---

<sup>3</sup> This formula is an approach to the first term of the Taylor series.



will take place from regions with higher price to regions with lower price, till reaching a balanced point.

For an easy understanding and justification, a physical analogy based on Fick's law has been applied. However, this formulation in our case is a simplification and actually this “*price flow*” will depend on multiple factors that should be taken into account. These multiple factors would mainly affect the definition of  $D$  in our particular case. For instance:

- The income in  $s_1$  and  $s_2$ .
- The price of related goods (whether complementary or substitute).
- The preferences and consumer culture in  $s_1$  and  $s_2$ .
- The production cost in  $s_1$  and  $s_2$ .
- Etc.

Basically, the same factors affect here as those ones on which depends the supply and demand law, together with those economic policies under which the regions of a specific free trade area are regulated. In other words, micro- and macro-economic factors are together here involved.

Other conditions that may affect the pricing structure of companies in environments with unbalanced economies are for example:

- 1) *Purchasing international policy of large distributors.* The international customers require price equality to the lowest common denominator. Those powerful retail traders will try to implement the lowest prices in the entire free trade area. For example, due to these reasons, many international purchasing groups have emerged in the area of consumer goods, all with the intention of achieving unified prices as low as possible.
- 2) *Increasing competition among manufacturers.* As international companies are experiencing a greater potential market for their products, they can benefit from economies of scale in production and marketing, implementing pricing pressures to the local manufacturers. These local manufacturers will be pushed to certain market niches or to constitute international alliances in order to increase their power.
- 3) *Changes in the procurement policy of governments or governmental companies.* The relationships between suppliers and government, which had traditionally been very well protected, will be broken as competition increases and international price levels begin to be under pressure (a good example of this phenomenon is the case of the telecommunications sector in the EU).
- 4) *Changes in purchasing behavior of local consumers.* A fact is that citizens travel more within the free trade area, developing consequently a better knowledge of the price structures in different countries. Although many of them still show a preference for local



brands, they are increasingly open to consider alternatives from other countries. Especially consumers who live near the borders with other states in the same free trade area, crossing borders just to buy whatever they think they can get a better price on the other side.

- 5) *Increased market transparency.* The growing popularity of new communication systems like the internet makes markets more transparent and less exclusive.
- 6) *Grey Market.* Grey markets usually appear when branded products, which are sold internationally, show considerable price differences between certain countries together with relatively low additional costs (transport, taxes, etc.). There are companies specialized in gray market operations that have large databases with lists of prices for various countries and products. When a price difference offers a possibility of profit these professionals exchange goods from one market to another. Advances in the information technologies, communication systems and databases, allow the consumers the possibility to operate themselves in the gray market.

In the case of the EU, the existence of the foregoing factors does not mean that Europe is already a homogenous market. The habits of consumers do not adjust immediately. Indeed, it is possible to retain a certain degree of differentiation of prices. In general terms, transport costs, differences in habits, consumers' preferences and purchasing capability, together with other factors justify the existence of certain variations within a free trade area with the same currency. Nevertheless, it is not futile if companies reconsider their pricing strategy in order to find a range of optimal prices for their products.

## CONCLUSION

The success or failure of a pricing strategy is mainly determined by the relevant product costs, price sensitivity by the customer, competitors' behavior etc. Since all of these elements vary with the stage of the product life cycle in the market, the pricing strategy will be obviously different in each phase of its life cycle and linked to the economic policy and legislation which is applicable to the trading area.

With the above scenario, this article considers the possibility of finding similarities with the Fick's law of diffusion, where areas of higher concentration of certain substances or molecules connected to areas of lower concentration, experience the effect of a flow that balances the concentrations of all connected regions. However, the formulation adapted to the case of the price disparity should consider other factors that do not appear in the physical world and that, ultimately, should take into account the consumer awareness and will of buying.



Assuming that exactly identical conditions are not possible to be reproduced in different regions of the same free trade area with same currency, what we can expect is just a certain balance but not necessarily the same prices. In order to reach a price balance (not the same price), it would be necessary to agree between the country members aspects like for example: estimating the optimal price level in each country; assessing the likelihood that parallel imports occur at these balanced prices; deciding whether to differentiate products in different countries or not; adjusting prices according to market size; etc.

#### SOURCES

- Dibb, S, Simkin, L. (2013). *Marketing Essentials* (2nd ed.). Andover, Cengage (In Press), pp. 250.
- Ellickson, P. B., Misra, S., & Nair, H. S. (2012). Repositioning dynamics and pricing strategy. *Journal of Marketing Research*, 49(6), 750-772.
- Gandhi, KS. (2012). Use of Fick's law and Maxwell–Stefan equations in computation of multicomponent diffusion. *AIChE Journal*, 58(11), 3601-3605.
- [http://en.wikipedia.org/wiki/Free\\_trade\\_area](http://en.wikipedia.org/wiki/Free_trade_area)
- [http://www.europa.eu.int/comm/internal\\_market](http://www.europa.eu.int/comm/internal_market)
- <http://newsoffice.mit.edu/2014/one-currency-one-price>
- Kireyev, P., Kumar, V., & Ofek, E. (2014). Match Your Own Price? Self-Matching as a Retailer's Multichannel Pricing Strategy.
- Lustig, H., Roussanov, N., & Verdelhan, A. (2011). Common risk factors in currency markets. *Review of Financial Studies*, 24(11), 3731-3777.
- Mandelbrot, B. B. (2010). *Fractals and scaling in finance: discontinuity, concentration, risk*. Springer Publishing Company, Incorporated.
- Philip & Keller, L. Kevin (2012). *Marketing Management* (14th ed). Pearson Education Limited
- Walter, I. (2014). Non-tariff barriers and the free-trade area option. *PSL Quarterly Review*, 22(88).