Honeywell / Novar: When it comes to fire, vertical has a taste of horizontal

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On 7 January 2005, Honeywell International Inc. ('Honeywell') notified the contemplated acquisition of the British company Novar plc ('Novar').

In the markets for fire alarm systems, the Commission investigated whether this transaction would raise vertical and horizontal issues, respectively, in the Nordic countries and in some countries such as Italy. Whereas it came to the conclusion that vertical issues should be dismissed, the Commission considered, however, that the transaction, as notified, raised serious doubts as it may have significantly impeded effective competition in Italy, as a result of the creation of a dominant position. The Commission finally cleared the operation, subject to the divestiture of Novar’s activities in this country.

This article analyses further, through simulations, the potential vertical competition issues that were raised in the Nordic countries. It illustrates the fact that the merger of two companies active in vertically related markets can lead to unilateral effects very similar to those caused by purely horizontal mergers, from both a qualitative and quantitative standpoint. (2)

I. The markets for fire alarms

The purpose of a fire alarm system is to detect a fire and report it to a central location or bring it to the direct attention of those within the vicinity directly through the emission of a loud signal.

The main components of a fire alarm system are the fire detectors and the fire panel. The former are dispatched to cover the area at stake and aim to detect fires and report them to the fire panel. They come along other peripheral components such as call points or sounders. These components are also connected to the fire panel. The latter receives the signals emitted by the fire detectors or other peripheral components and is programmed to trigger specific action accordingly (triggers sounders, closes doors, calls fire department, etc.). The panel typically accounts for a mere 10%-20% of the overall cost of the fire alarm system. In most of them sold nowadays, the fire detectors and the other peripheral components communicates with the panel using a proprietary protocol. The protocol is defined by each manufacturer of fire detectors.

At least, three vertically-related markets can be identified with respect to fire alarms:

(i) the supply of components for fire alarm systems to system integrators (supply of fire detectors, call points, sounders, etc.)

(ii) the supply of fire alarm systems to installers: it consists of adding the fire panel to the peripheral components (in order to make them communicate together and fulfil the expected functions)

(iii) the installation and servicing of fire alarm systems in the premises of the end-customer.

The latter market did not lead to any significant vertical or horizontal competition issues and will not be further detailed hereunder.

The Commission found that most of these markets are still national in scope. It left the question open as to whether the market for fire detectors could be wider in scope.

II. The situation in Nordic countries

In the Nordic countries (Norway, Finland, Denmark and Sweden), Honeywell is active only on the market for fire components to system integrators. It sells its components — in particular its fire detectors — to ESMI. This company manufactures panels which can communicate with Honeywell’s components using Honeywell’s protocol. In turn, ESMI markets the complete fire alarm systems.

Novar manufactures fire detectors but do not market them. They are used internally to be sold along with the fire panels manufactured by Novar, as fire alarm systems. The only market on which Novar is actually active is thus the market for fire alarm systems. This market is described in figure 1.

(1) The author thanks the head of unit in charge of this case, Claude Rakovsky, the other members of the Honeywell / Novar case team, Tiina Pitkanen and Guillaume Loriot, as well as Miguel de la Mano and Benoît Durand, members of the Chief Economist Team, for many fruitful discussions.

(2) It is emphasised that this article does not summarise the analysis already contained in the Commission’s final decision but rather elaborates on the market setting of the case as a basis for a simulation.
As a result, the merger brings together companies which are not primarily active on the same market, but on vertically-related markets. It is also worth noting that there is no supplier-customer relationship between Honeywell and Novar pre-merger. The question arises as to which economic mechanisms may be at stake in this setting and how to evaluate whether (and to what extent) such merger may be detrimental to competition. To this end, we developed a economic model which is described below.

### III. The economic model

#### a. Model reflecting the settings of the case

The following economic model aims to capture the change of incentives of the merging parties further to the merger, in the environment in which they compete. Indeed, after the merger, it is rational for the merged entity to set the prices of its different products (fire detectors to ESMI, for Honeywell and fire alarm system for Novar downstream) so that it maximises its overall profit (and not only the profit of each firm separately).

To this end, we consider a setting composed of a total of $n$ firms competing on the downstream market (fire alarm system). Each firm $i$ manufactures fire alarm systems at a cost $c_i$ and sells them at a price $p_i$ and in quantities $q_i$.

Honeywell is firm 1’ (1). It manufactures fire detectors (and other peripheral components) at cost $c_{1'}$ and sell them to Firm 1 (representing ESMI) at a price $p_{1'}$, and in quantities $q_{1'}$. Firm 1’ and firm 1 are thus the two companies which are not vertically integrated. Firm 2 is Novar. We aim to simulate the merger of Firm 1’ and Firm 2. These settings are described in figure 2.

(1) All parameters relating to the upstream market are referred using a prime.

(2) We consider a fixed ratio between intermediate and final goods, here equal to 1 for the sake of simplicity. This means that the price $p_{1'}$ is that of the average number of fire detectors in a fire alarm system.

The market for fire alarm systems is characterised by competition on prices (Bertrand) and demand can be approximated as a linear function of the prices:

$$q_i = \alpha_i + \sum_{j=1}^{n} \gamma_{ij} \cdot p_j$$

The profit of the firms is as follows:

- Firm 1’:
  $$\pi_{1'} = (p_{1'} - c_{1'}) \cdot q_{1'}$$
- Firm 1:
  $$\pi_1 = (p_1 - c_1 - p_{1'}) \cdot q_1$$
- Any other firm $i$:
  $$\pi_i = (p_i - c_i) \cdot q_i$$

#### Pre-merger scenario

Pre-merger, by taking account of the demand function, the optimisation of each firm’s profit ($\delta \pi_i = 0$), leads to a linear system whose solution is the series of pre-merger prices. This system can be written using matrices with $(n + 1)$ rows and columns, as described in equation 1, and solved by inverting the square matrix. This model thus provides a way to easily compute the prices and quantities at the equilibrium.

#### Post-merger scenario

Further to the merger, the merged entities incentives have changed since it can set the prices $p_{1'}$ (of the upstream goods sold to Firm 1) and $p_2$ (of the final goods sold by Firm 2) so as to optimise its overall profit $\pi_1 + \pi_2$. This implies replacing the separate pre-merger profit optimisation

$$\delta \pi_1 = 0 \quad \text{and} \quad \delta \pi_2 = 0$$

with the optimisation of the combined profit of the merged entity:

$$\delta (\pi_1 + \pi_2) = 0$$

and

$$\delta (\pi_1 + \pi_2) = 0.$$
As result, one can derive the price increases and the quantity reductions due to the merger, for each firm.

b. Model reflecting a horizontal merger

In order to have a point of comparison to assess the outcome of the above-described model, it is interesting to compare it with a classic horizontal merger, such as the merger of firms 1 and 2, where firm 1 would be already vertically integrated and manufacture the final goods at a cost equal to \( c_1' + c_1 \).

The same methodology can be used as above to derive the linear systems which provide the equilibrium prices. Pre-merger, profit optimisation leads to equations of the type: \( \frac{\delta \pi_i}{\delta p_i} = 0 \) for each firm i. Post merger, the profit optimisation equations of the merging firms (firm 1 and firm 2) must be replaced with: \( \frac{\delta (\pi_1 + \pi_2)}{\delta p_1} = 0 \) and \( \frac{\delta (\pi_1 + \pi_2)}{\delta p_2} = 0 \). The pre-merger and post-merger solutions are described in equations 3 and 4.

IV. Simulations

The above-described models require that the parameters of the demand function be defined (i.e. the \( \alpha_i \) and \( \gamma_{ij} \)) as well as the marginal costs of the firms \( (c_i) \). In the simulations below, we considered that all firms had the same marginal cost, equal to 1. This marginal cost is split into two for firms 1' and firm 1: 0.8 and 0.2, respectively. This corresponds to the typical breakdown in the fire alarm systems between peripheral components and the fire panel.

As for the demand, we relied on a set of parameter values for \( \alpha \) and \( \gamma_{ij} \) corresponding to elasticities of about -3 and 1, respectively for each player’s own-price-elasticity and the cross-price-elasticities. Such elasticities are reasonable for markets such as fire alarm systems. In the framework of an in-depth investigation, real elasticities could be estimated on the basis of market data.

\( (1) \) All \( \alpha \) are equal to 1. \( \gamma_{ii} \) are equal to -1 and all other \( \gamma_{ij} \) to 0.33 when \( n \) equals 3.

a. Simulation with the case settings

In a setting where 3 firms are competing on the downstream market (i.e. \( n=3 \)), the results of the simulation are the following:

<table>
<thead>
<tr>
<th></th>
<th>Firm 1’</th>
<th>Firm 1</th>
<th>Firm 2</th>
<th>Firm 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-merger</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price</td>
<td>1.33</td>
<td>1.78</td>
<td>1.55</td>
<td>1.55</td>
</tr>
<tr>
<td>Post-merger</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price</td>
<td>1.49</td>
<td>1.88</td>
<td>1.69</td>
<td>1.59</td>
</tr>
<tr>
<td>( \Delta ) Price</td>
<td>+ 12%</td>
<td>+ 6%</td>
<td>+ 9%</td>
<td>+ 3%</td>
</tr>
<tr>
<td>( \Delta ) quant.</td>
<td>- 20%</td>
<td>- 16%</td>
<td>- 7%</td>
<td></td>
</tr>
<tr>
<td>( \Delta ) profit</td>
<td>+ 4%</td>
<td>- 36%</td>
<td>+ 5%</td>
<td>+ 18%</td>
</tr>
</tbody>
</table>

Model 1: Impact of the vertical merger.

These results confirm that, further to the merger, the merging parties have strong incentives to raise the price of the intermediate good (here by 12%). Indeed, as result, the firm 1’ passes through only a part of the price increase (prices of Firm 1’ increase only by 6%): the loss of volume is limited for Firm 1 while it sells at a higher price. In addition, part of the sales lost by Firm 1 will be captured by Firm 2, thus increasing further the merged entity’s profit. The higher prices offered by firm 1 (because of firm 1’) and firm 2 reduce in turn the constraints on the remaining competitor which not only gain customers lost by Firm 1 but can also afford to slightly increase its prices.

As a result, Firm 1 faces a price increase of 12% of its input. The customers of fire alarm systems experience price increases ranging from 3% to 9%. The overall quantities available on the market are reduced by 7%.

Firm 1, which is dependent on one of the merging parties, loses the most by far, its profit plummeting by 36% because of two combined effects: faced a price increase of its input, it is forced to increase its prices in turn. This reduces the quantity of goods it sells. Secondly, the competitive constraints on the market do not allow him to wholly pass on the price increase of its input. For each good sold, its margin is hence also reduced. Interestingly enough, the remaining competitors are those who benefit the most from the merger. These results give a hint about who may or may not complain about the transaction.

b. Comparison with a purely horizontal merger

It is interesting to compare the above-described impacts of the merger with those of a purely horizontal merger, occurring in the same conditions. To this end, we applied the parameters of
the previous simulation to the horizontal-merger model described in section III.b. The outcome is provided in the table below.

<table>
<thead>
<tr>
<th></th>
<th>Firm 1</th>
<th>Firm 2</th>
<th>Firm 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-merger</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price</td>
<td>1.49</td>
<td>1.49</td>
<td>1.49</td>
</tr>
<tr>
<td><strong>Post-merger</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price</td>
<td>1.62</td>
<td>1.62</td>
<td>1.54</td>
</tr>
<tr>
<td>(\Delta) Price</td>
<td>+9%</td>
<td>+9%</td>
<td>+3%</td>
</tr>
<tr>
<td>(\Delta) quant.</td>
<td>-15%</td>
<td>-15%</td>
<td>+9%</td>
</tr>
<tr>
<td>(\Delta) profit</td>
<td>+8%</td>
<td>8%</td>
<td>18%</td>
</tr>
</tbody>
</table>

Model 2: Impact of the horizontal merger. (1)

First, this table shows that the pre-merger prices in Model 2 are lower than those predicted by Model 1. This is due to the fact that, in Model 2, Firm 1 is vertically integrated. It illustrates the positive effect of the elimination of the double marginalisation. A contrario, it makes it clear that the vertical merger at stake (Model 1) does not cause any elimination of the double margin which could have reduced the negative effects of the merger.

The impacts of the previously-described vertical merger appear to be very similar to those of the horizontal merger: price increases range from 3% to 9% and the quantities overall available on the market are reduced by 7%. The non-merging company benefits the most from the merger, as its profit soars by 18%.

It could be argued that the effects of this merger are very similar to those of a purely-horizontal merger simply because the downstream company, Firm 1, accounts only for 20% in the cost of the final product; its presence is not so significant. However, this explanation is infirmed by the simulations: the price increases in the downstream market remain unaltered irrespective of the weight of each firm (Firm 1’ and Firm 1) in the cost of the final good. The only change is that, the smaller the share of Firm 1’ in the cost of the final good, the higher the price increase of the intermediate good sold to Firm 1 further to the merger: firm 1’ adjusts its price to Firm 1 so as to mainly optimise the profit derived from the sales of the vertically-integrated party to the merger: Firm 2.

IV. Conclusion

In the case of the acquisition of Novar by Honeywell, it was finally found that the merger was unlikely to raise serious doubts in the Nordic countries. First, Novar’s market share turned out to be smaller and those of the main competitors significantly higher, depending on the Nordic country at stake. As a result, the sales lost by ESMI further to a hypothetical price increase by Honeywell would not be captured by the merged entity to a large extent, but by its remaining competitors. Price increases are thus likely to remain limited. More importantly, the Commission came to the conclusion that it is not so difficult for a panel manufacturer to adapt its panels to the protocol of other fire detectors. The threat that ESMI may switch to other suppliers (as they already did in the past) appears credible enough to prevent significant price increases further to the merger.

However, these simulations, along with the analysis of the economic mechanisms at stake, remain interesting examples showing that a merger between companies active in vertically-related markets does not systematically eliminate the double marginalisation and may cause effects on the market similar — both quantitatively and qualitatively — to those of a purely horizontal merger. It can be shown that such negative effects would still materialise — even though to a lesser extent — if Firm 2 (Novar) was not vertically integrated, i.e. was active only downstream.

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(1) As for quantities, the model predicts 0.25 for Firms 1’ and 1, 0.55 for firms 2 and 3, pre-merger. Post-merger, they become respectively 0.20 for Firms 1’ and 1, 0.46 for firm 2 and 0.59 for firm 3.