Abstract

Current EU law states that the competition authorities, in dealing with a merger proposal, cannot propose remedies to the parties and have to resort to accept or reject remedies proposed to it. We show that giving the authorities the power to propose remedies for a merger that they cannot accept in full, will lead to a more efficient merger policy. We do this by setting up a theoretic model where government lacks information about the various markets affected by the merger and has resources to collect information on some but not all of them.

Key words: merger policy; merger remedies; commitment
JEL Codes: L40; G34


1 Introduction

According to EU law, the European commission can accept or reject a merger proposal. In case a proposal cannot be accepted as is, the merging parties can offer remedies, \textit{i.e.}, a down-scaled version of the original merger proposal.\footnote{There is a distinction between structural and behavioral remedies. We focus here on structural remedies, i.e. divestitures of assets. Behavioural remedies imply putting restrictions on the merged firm's control of its assets, rather than requiring it to sell any of them. See Wood (2003) and Motta, et al. (2007) for general discussions of merger remedies in US and EU law.} It is not possible for the authorities to suggest remedies as they reject a merger proposal.\footnote{See, e.g., Brink, et al. (2016). There seems to be a difference between US and EU merger policies at this point. In the US, remedies are negotiated, which appears to open up for more commitment on the part of government than in the EU.} In this paper, we show that allowing the authorities to themselves offer remedies would be more efficient.

The basis for this finding is the observation that the firms involved in a merger are very often involved in many markets, with the proposed merger affecting these various markets differently. At the same time, the competition authorities have limited resources available and will have to use these resources wisely in order to collect the information needed to assess a merger proposal in the most efficient way possible. We find that providing them with the ability to commit to accepting a particular set of remedies would allow the competition authorities to save on expenses on information collection, thereby making for a more efficient merger policy.

To study the issue, we present a model where some firms make a merger proposal to the competition authorities. The merger would affect two markets, and the government does not know at the outset whether the effect in a particular market is positive or negative. While the government agency has resources to collect information, it does not have enough to become fully informed by collecting perfect information on both markets in question. So the agency has to decide whether to collect information, and if so in which of the two markets to do it.

We compare two versions of the model. In one version, the government responds to a merger proposal by either accepting or rejecting it. In case of a rejection, the parties can either give up on the merger or come back to government with a revised merger proposal – the remedies – which then is accepted or rejected by government, after which the game ends. The decision whether or not to accept the proposal is possibly based on information that government has collected from a close scrutiny of one of the markets in question.

In the other version of the model, the government can, as a response to a merger proposal, amend a rejection of it with its own proposal of remedies, which the parties then can choose to accept or not. If they accept, then the reduced merger is carried out. Our main analysis is a comparison of the two versions of the model, finding conditions such that the second version, with commitment on the part of government, is more efficient. In particular, we highlight cases where such an ability to commit saves on expenses on information collection.
without distorting government’s decision on the merger proposal.

Most other theoretical studies of merger remedies discuss whether their availability is welfare-improving. These studies typically posit a Cournot market where all parts of the industry are equal, so that there is no room for the competition agency to consider where to direct its information-collecting efforts. They also typically assume that the competition agency is able to commit to remedies. One such study is by Vasconcelos (2010), who discusses the notion of over-fixing when remedies are available, an issue discussed earlier by Farrell (2003): the availability of remedies may cause the competition agency to demand too much of them, because of a hold-up problem. As Vasconcelos (2010) argues, this problem of over-fixing disappears when the analysis is extended to allow a sequence of mergers.

Cosnita-Langlais and Sørgard (2018) discuss the effect of allowing for remedies in a situation where government has available an imprecise technology for collecting information and therefore makes both type-I and type-II errors. Like us, Cosnita-Langlais and Sørgard (2018) thus model the competition agency’s investigations.3 But while we allow for a merger’s harm being multi-dimensional – it might be good for welfare in one market and bad in another – these authors model harm as one-dimensional.

Dertwinkel-Kalt and Wey (2016a) model a situation where only the firms behind a proposal can offer remedies, which is what EU competition law prescribes.4 The authors discuss the effect on welfare of allowing remedies in this setting. They do not, as we do, compare with the case when government is able to commit to remedies.

Also in Dertwinkel-Kalt and Wey (2016b), firms offer remedies in a situation where they have private information about the merger’s harm, which gives rise to a signalling game. As in the other contributions mentioned here, firms operate in a Cournot market, and remedies vary continuously. In our assessment of the value for the government of being able to commit to remedies, we build a simple model in which it is a binary decision to offer a remedy, whether that offer comes from government or from the firms.

Cabral (2003) studies a model where three firms enter sequentially on a Salop circle and discusses the assessment of mergers between the two first-movers. Interestingly, his distinction between forced and voluntary remedies is close to our distinction between the situation with and without commitment to remedies on the part of government.

The paper is organized as follows. In the next Section, we present our model. In Section 3, we analyze the model when government cannot commit to merger remedies. In Section 4, we discuss the model when government can commit, and we compare the two versions of the model. In Section 5, we offer some concluding remarks.

3See also Lyons and Medvedev (2007).
4See also Vergé (2010). Cosnita-Langlais and Tropeano (2012) discuss several cases, some where firms can propose remedies, and some where they cannot.
2 Model

Consider a situation where a group of firms proposes a merger to government. The merger has effects on two markets where the firms operate, markets 1 and 2. Although the firms know, government does not know the welfare effects of the proposed merger in the two markets. The effects are either positive or negative. In particular, we assume that the welfare effect of a merger in market \( i \), \( s_i \), is either \( \Delta \) or \( -\Delta \), where \( \Delta > 0 \). The probability of harm (i.e., the probability that the effect is negative) in market \( i \in \{1, 2\} \) is \( p_i \), where, without loss of generality, we assume that

\[
p_1 \geq p_2,
\]

i.e., that the chance for the merger to affect harm is greater in market 1. The welfare effects in the two markets are statistically independent.

The firms would like to operate the merged firm in both markets, if they are allowed. They prefer operating in only one market to none, and they prefer operating in a market causing harm to welfare to one causing benefit.

After having received the merger proposal, government decides whether to collect information. Because of limited resources, government is able to collect information about at most one of the two markets. Collecting information costs \( K \in (0, \frac{\Delta}{2}) \). The collected information is perfect, so that government, after collection of information in market \( i \), knows for sure whether the merger is harmful or beneficial in market \( i \).

A remedy in this model is the firms selling their operation in one of the two markets. We assume that there exists a buyer outside the industry to take over the asset.\(^5\) We will be analyzing two versions of this model. In one version, the government cannot offer remedies. Specifically, it cannot promise that a reduced merger will be approved given that a particular remedy is accepted. A remedy offer must then come from the firms. In the other version, government has such commitment power and can, in one operation, both disapprove a merger tentatively and offer a set of remedies that would be accepted at a later stage.

3 Remedies without commitment

In this section, we study the following game:

1. A group of firms proposes a merger.

2. Government decides whether or not to collect information, and if information is collected, from which market. Collecting information costs \( K \). Collected information on a market perfectly reveals the merger's effect on that market. The information is shared with the firms.

\(^5\)With this simplification, we sidestep potentially important issues, such as who should make sure that a buyer is in fact in place in case of a divestiture.
3. Government makes a tentative decision on whether or not to approve the merger. If it, at this stage, says yes to the merger, then the game ends and the merger is carried through.

4. The firms decide whether or not to offer remedies. If they do not, then the game ends and the merger is not carried through. A remedy is to sell out the operation in either market one or market two.\(^6\)

5. Government makes the final decision on whether to approve the merger with remedies.

The crucial aspect of this game is that government at stage 3 can only say tentatively yes or no to a merger and is unable to require remedies that would make the (reduced) merger acceptable.

In analyzing this game, we discuss separately the game after each of the three possible decisions at stage 2. Consider first the case when government does not collect any information. At stage 3, government approves the merger when its expected effect on total welfare is non-negative, i.e., when

\[
E[W] = \sum_{i \in \{1, 2\}} [(1 - p_i) \Delta - \Delta p_i] = 2\Delta (1 - p_1 - p_2) \geq 0,
\]

where the inequality is equivalent to

\[
p_1 + p_2 \leq 1. \quad (1)
\]

Note that (1) implies \(p_2 \leq \frac{1}{2}\), since \(p_1 \geq p_2\) by assumption.

If

\[
p_1 + p_2 > 1,
\]

then government says no to the merger at stage 3. The question is what the firms do at stage 4 in this case. Note that (2) implies \(p_1 > \frac{1}{2}\), again since \(p_1 \geq p_2\). Similarly, \(p_2 > \frac{1}{2}\) implies that (2) must hold and thus that the merger will not be approved at this stage. In order to get the merger through, the firms will in this case have to offer remedies.

We can summarize the outcome as follows:

**Lemma 1** Consider the no-commitment game. Suppose government does not collect any information at stage 2.

(i) If \(p_1 + p_2 \leq 1\), then the merger is approved at stage 3 and the game ends without remedies. Government’s expected payoff is \(2\Delta (1 - p_1 - p_2)\).

(ii) If \(p_1 + p_2 > 1\) and \(p_2 \leq \frac{1}{2}\), then the merger is not approved at stage 3, the firms offer remedies in market 1, and the reduced merger is eventually approved. Government’s expected payoff is \(\Delta (1 - p_2)\).

(iii) If \(p_1 + p_2 > 1\) and \(p_2 > \frac{1}{2}\), then the merger is not approved at stage 3, and the firms do not offer remedies and instead cancel the merger. Government’s payoff is 0.

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\(^6\)We disregard any effect the way the sell-out is done, including the identity of the buyer, may have on welfare.
Proof. Parts (i) and (iii) are straightforward. Consider, therefore, part (ii). Note that, when the two markets differ, i.e., when either $s_1 = -\Delta$ and $s_2 = \Delta$, or $s_1 = \Delta$ and $s_2 = -\Delta$, the firms would like to keep the harmful market. This works fine in the latter case when $p_2 \leq \frac{1}{2}$. However, in the former case, offering remedies in market 2 would lead government to stop the merger, since here $p_1 > \frac{1}{2}$. Thus, in the case of part (ii), the offered remedies are always in market 1.

Consider next the case when government incurs cost $K$ and collects information in market 1, where a merger is more likely to bring harm.

Lemma 2 Consider the no-commitment game. Suppose government collects information at stage 2 in market 1.

(i) With probability $p_1$, government finds that the merger will bring harm in this market, i.e., that $s_1 = -\Delta$. Government disapproves the merger at stage 3. If $p_2 \geq \frac{1}{2}$, then the firms do not offer remedies and cancel the merger; government’s payoff is $-K$. If $p_2 < \frac{1}{2}$, then the firms offer remedies in market 1, and the reduced merger is eventually approved; government’s expected payoff is $\Delta (1 - p_2) - K$.

(ii) With probability $(1 - p_1)$, government finds that the merger will bring benefit in this market, i.e., that $s_1 = \Delta$. Government approves the merger at stage 3 and the game ends with no remedies; government’s expected payoff is $\Delta + [(1 - p_2) \Delta - \Delta p_2] - K = 2\Delta (1 - p_2) - K$.

(iii) Government’s ex-ante expected payoff is

\[
2\Delta (1 - p_1) (1 - p_2) - K, \quad \text{if } p_2 \geq \frac{1}{2}; \\
\Delta [2 (1 - p_2) - p_1] - K, \quad \text{if } p_2 < \frac{1}{2}.
\]

The proof is straightforward.

Finally, consider the case when government incurs cost $K$ to collect information in market 2.

Lemma 3 Consider the no-commitment game. Suppose government collects information at stage 2 in market 2.

(i) With probability $p_2$, government finds that the merger will bring harm in this market, i.e., that $s_2 = -\Delta$. Government disapproves the merger at stage 3. If $p_1 \geq \frac{1}{2}$, then the firms do not offer remedies and cancel the merger; government’s payoff is $-K$. If $p_1 < \frac{1}{2}$, then the firms offer remedies in market 2, and the reduced merger is eventually approved; government’s expected payoff is $\Delta (1 - p_1) - K$.

(ii) With probability $(1 - p_2)$, government finds that the merger will bring benefit in this market, i.e., that $s_2 = \Delta$. Government approves the merger at stage 3 and the game ends with no remedies; government’s expected payoff is $2\Delta (1 - p_1) - K$.

(iii) Government’s ex-ante expected payoff is

\[
2\Delta (1 - p_1) (1 - p_2) - K, \quad \text{if } p_1 \geq \frac{1}{2}; \\
\Delta [2 (1 - p_2) - p_1] - K, \quad \text{if } p_1 < \frac{1}{2}.
\]
Next step is to find out what government will do, conditioned on it collecting information at stage 2.

**Lemma 4** Consider the no-commitment game. Suppose government will collect information at stage 2.

(i) If \( p_2 \leq \frac{1}{2} \), then government collects information in market 1 and has expected payoff \( \Delta [2(1 - p_2) - p_1] - K \).

(ii) If \( p_2 > \frac{1}{2} \), then government is indifferent between markets 1 and 2 and has expected payoff \( 2\Delta (1 - p_1) (1 - p_2) - K \).

As Lemma 4 makes clear, government weakly prefers collecting information in market 1. In the following, we will disregard its indifference when \( p_2 > \frac{1}{2} \).

We can now summarize. For that purpose, define

\[
\lambda := \frac{K}{\Delta} < \frac{1}{2},
\]

which is a measure of the cost of information relative to the value of information.

**Proposition 1** Consider the no-commitment game. The equilibrium is as follows:

(i) If \( p_1 < \lambda \), then government does not collect information. It approves the merger as is, with an expected payoff of \( 2\Delta (1 - p_1 - p_2) \geq 0 \).

(ii) If either (a) \( p_1 + p_2 \leq 1 \) and \( p_1 \geq \lambda \), or (b) \( p_1 + p_2 > 1 \), \( p_2 \leq \frac{1}{2} \), and \( p_1 < 1 - \lambda \), then government collects information from market 1. If the information is positive, then the merger is approved. If the information is negative, then the merger is tentatively stopped, the firms offer remedies in market 1, and the reduced merger is approved. Government’s ex-ante expected payoff is \( \Delta [2(1 - p_2) - p_1] - K \geq 0 \).

(iii) If \( p_1 + p_2 > 1 \), \( p_2 \leq \frac{1}{2} \), and \( p_1 > 1 - \lambda \), then government does not collect information. It tentatively stops the merger, the firms then offer remedies in market 1, and the reduced merger is approved. Government’s ex-ante expected payoff is \( \Delta (1 - 2p_2) \geq 0 \).

(iv) If \( p_2 > \frac{1}{2} \) and \( (1 - p_1) (1 - p_2) \geq \frac{1}{2} \), then government collects information from market 1. If information is positive, then the merger is approved. If the information is negative, then the merger is stopped, and the firms cancel the merger without offering remedies. Government’s ex-ante expected payoff is \( 2\Delta (1 - p_1) (1 - p_2) - K \geq 0 \).

(v) Otherwise, i.e., if \( p_2 > \frac{1}{2} \) and \( (1 - p_1) (1 - p_2) < \frac{1}{2} \), then government does not collect information. It does not approve the merger, and the firms cancel the merger without offering remedies. Government’s payoff is 0.

We can draw a diagram to illustrate this – see Figure 1, which is drawn for the case of \( \lambda = \frac{1}{2} \). Each area in the figure corresponds to a case in Proposition 1. In areas (ii) and (iv), corresponding to cases (ii) and (iv), government collects information in market 1, where it is more likely to be harm, and approves the merger if the information is positive. If information is negative, then the
firms come back with a proposal for remedies in case (iii), while the merger is abandoned in case (iv). In cases (i), (iii), and (v), government does not collect information. In case (i), prospects are so good that government approves the merger straight away without collecting information. The opposite is the case in case (v), when government rejects the merger without collecting any information and the firms abandon their plans. In case (iii), government also does not collect information, but now the firms come back with remedies in market 1, which is where harm is more likely.

4 Remedies with commitment

We now make one change in the game of the previous section: we allow government, when deciding to approve the merger at stage 3, to do so conditional on a particular remedy. In effect, this means that government can commit to approving the merger only if that remedy is included in the revised proposal. The game now looks as follows.

1. A group of firms propose a merger.

2. Government decides whether or not to collect information, and if information is collected, from which market. Collecting information costs $K$. Collected information on a market perfectly reveals the merger’s effect on that market. The information is shared with the firms.
3. Government makes a decision on whether to allow the merger as is, allow it with a particular remedy, or reject it. If it at this stage says yes to the merger as is, then the game ends and the merger is carried through.

4. The firms decide whether or not to accept the remedies specified by government. If they do not, then the game ends and the merger is not carried through. If they do, then the reduced merger is carried through. A remedy is to sell out the operation in either market one or market two.

Consider first the case when government does not collect any information at stage 2. At stage 3, it has four alternatives to consider: accepting the merger as is; demanding remedies in market 1; demanding remedies in market 2; or rejecting the merger. As above, accepting the merger as is gives government an expected payoff of \(2(1 - p_1 p_2)\). Requiring remedies in market 1 has an expected payoff of \(\Delta (1 - 2p_2)\); requiring remedies in market 2 is dominated by requiring remedies in market 1, since, because \(p_1 \geq p_2\), it provides an expected payoff of \(\Delta (1 - 2p_1) \leq \Delta (1 - 2p_2)\). Rejecting the merger gives a payoff of 0.

We have:

**Lemma 5** Consider the commitment game. Suppose government does not collect information at stage 2.

(i) If \(p_1 \leq \frac{1}{2}\), then government approves the merger as is, for an ex-ante expected payoff of \(2\Delta (1 - p_1 - p_2)\).

(ii) If \(p_2 \leq \frac{1}{2} < p_1\), then government demands remedies in market 1, which the firms accept, with an expected payoff to government of \(\Delta (1 - 2p_2)\).

(iii) If \(p_2 > \frac{1}{2}\), then government stops the merger, for a government payoff of 0.

The analysis of the cases where government collects information from either market 1 or market 2 is identical to the one in the previous section; see Lemmas 2 through 4. The reason for this is that, when government has collected information, commitment has no bite: the firms will offer remedies exactly when government would want them to. We can summarize the commitment game as follows.

**Proposition 2** Consider the commitment game. The equilibrium is as follows:

(i) If \(p_1 < \lambda\), then government does not collect information. It approves the merger as is, with an expected payoff of \(2\Delta (1 - p_1 - p_2) \geq 0\).

(ii) If \(\lambda \leq p_1 < 1 - \lambda\), and \(p_2 \leq \frac{1}{2}\), then government collects information from market 1. If the information is positive, then the merger is approved. If the information is negative, then government requires remedies in market 1. Government’s ex-ante expected payoff is \(\Delta [2(1 - p_2) - p_1] - K \geq 0\).

(iii) If \(p_1 \geq 1 - \lambda\), and \(p_2 \leq \frac{1}{2}\), then government does not collect information and requires remedies in market 1. Government’s ex-ante expected payoff is \(\Delta (1 - 2p_2) \geq 0\).

(iv) If \(p_2 > \frac{1}{2}\) and \((1 - p_1)(1 - p_2) \geq \frac{1}{2}\), then government collects information from market 1. If the information is positive, then the merger is approved.
If the information is negative, then government requires remedies in market 1. Government’s ex-ante expected payoff is $2\Delta (1 - p_1)(1 - p_2) - K \geq 0$.

(v) Otherwise, i.e., if $p_2 > \frac{1}{2}$ and $(1 - p_1)(1 - p_2) < \frac{1}{2}$, then government does not collect information and does not approve the merger. Government’s payoff is 0.

This result is illustrated in Figure 2, which again is drawn for the case of $\lambda = \frac{1}{5}$.

We can now compare the two games of no commitment and commitment. By comparing Propositions 1 and 2, we have:

**Proposition 3**

(i) The outcome – full, reduced or no merger – is always the same in the two games.

(ii) If $p_1 + p_2 \leq 1$, and $p_1 \geq 1 - \lambda$, then remedies are obtained without government collecting information in the commitment game while remedies follow after government collects information in the no-commitment game.

(iii) Otherwise, the government’s decision to collect information is the same in the two games.

(iv) Having the ability to commit is weakly preferred by government.

In the case delineated by part (ii) of Proposition 3, it is not possible for government, when it is not able to commit, to obtain remedies without collecting information. If government were to suggest remedies in this case without the ability to commit, then the firms would simply disregard the suggestion and go on with a full merger. Note that part (iv) in the Proposition follows from the costs associated with collecting information.
Case (ii) of Proposition 3 corresponds to the blue area in Figure 2. This area depicts combinations of $p_1$ and $p_2$ such that government saves on costs of collecting information when it is able to commit. When $p_1$ is very high, the ex-ante assessment is that the merger most likely will do harm in market 1. But as long as, at the same time, $p_1 + p_2 < 1$, the ex-ante expected welfare effect of the merger is positive. When government can instruct the firms to offer remedies, it would in this case want to do this without collecting the information. This is the benefit for government of being able to commit.

5 Concluding remarks

We have shown in this paper that it would help on welfare to let government commit to merger remedies. This is done in a setting with two characteristics of merger cases that are prevalent in real life: that a merger’s harm is multi-dimensional, such that a merger can be harmful in one dimension and beneficial in another dimension; and that the competition agency has limited resources, so that it cannot investigate all those dimensions. The benefit of commitment is the ability it provides government to instill remedies without investigations.

In our analysis, we have assumed that a merger’s harm in one market is uncorrelated with its harm in the other market. While we have not carried out a detailed analysis of the case of correlated harm, it is clear that such a correlation would make information collection in one market more valuable, since it would be informative also about harm in the other market. In terms of the our model, this would mean a decrease in the relative cost of information, $\lambda$, and therefore a reduced role for commitment to play a role.

We also have assumed that a buyer outside the industry is available, so that a remedy will always be carried out efficiently. And we have assumed that the competition agency, when investigating a market, obtains perfect information about it. With respect to both these assumptions, it would be of value to see how various ways of relaxing them would affect our result.

References


