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# On the impossibility of insider trade in rational expectations equilibria



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### ABSTRACT

Existing no trade results are based on the common prior assumption (CPA). This paper identifies a strictly weaker condition than the CPA under which speculative trade is impossible in a rational expectations equilibrium (REE). As our main finding, we demonstrate the impossibility of speculative asset trade in an REE whenever an insider is involved who knows the asset's true value. To model insider trade as an equilibrium phenomenon an alternative equilibrium concept than the REE is thus required.

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## 1. Introduction

The [Levin-Coburn report \(2011\)](#) describes in some detail how Goldman Sachs sold off in 2007 collateral debt obligations (CDO) to gullible investors. At this point Goldman Sachs already knew that these CDOs were worthless so that they made gains from trade by exploiting their informational advantage. Existing no trade results ([Milgrom & Stokey, 1982](#); [Sebenius & Geanakoplos, 1983](#); [Tirole, 1982](#)) tell us, however, that gains from trade based on informational advantage are impossible in a rational expectations equilibrium (REE) ([Radner, 1979](#)) whenever the economic agents share a common prior.

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According to these no trade results, Goldman Sachs could thus only sell the CDOs because the investors either violated the rationality requirements of an REE or they violated the common priors assumption (CPA).

This paper presents a no trade result which establishes the impossibility of speculative trade whenever the agents' beliefs are *ex post homogenous*. Ex post homogeneity of beliefs is a strictly weaker condition than the CPA and, in contrast to the CPA, it might be trivially satisfied in relevant situations. In particular, we demonstrate that speculative asset trade is impossible in an REE whenever it involves an insider with perfect knowledge about the asset's true value. That is, for any specification of the priors of Goldman Sachs and of the investors, respectively, Goldman Sachs should not have been able to sell the CDOs to investors who had been rational in the sense of an REE.

It is a common perception in the literature that the CPA is crucial to no trade results. For example, in an influential article [Morris \(1995\)](#) writes:

"Aumann's work stimulated work on *no trade* results which establish that, in the absence of *ex ante* gains from trade, asymmetric information cannot generate trade. In particular, [Sebenius and Geanakoplos \(1983\)](#)—extending Aumann's argument—showed that (under the common prior assumption) it cannot be common knowledge that risk neutral individuals are prepared to bet against each other, that is, that one individual's posterior beliefs exceed another's. [Milgrom and Stokey \(1982\)](#) showed an analogous result in a more general setting of risk averse traders. Since no trade results can be shown to underlie many important results in microeconomic theory, it had by now become clear that the common prior assumption was critical." (p. 230)

Because of this perception, the controversy about whether no trade theorems have much practical relevance or not has become entangled with the controversy about the appeal of the CPA ([Aumann, 1998](#); [Gul, 1998](#)). For example, I have met more than one colleague who would argue that no trade results are practically irrelevant because the CPA has not much realistic appeal.

In contrast, this paper shows that the question about the relevance of no trade results can be (at least to some degree) disentangled from the question about the appeal of the CPA. Moreover, our analysis suggests that violations of the rational expectations paradigm rather than different priors may be the reason for the occurrence of speculative trade such as the selling of CDOs by Goldman Sachs. Motivated by the analysis in this paper, [Zimper \(2013\)](#) constructs a non REE competitive equilibrium framework such that boundedly rational agents may have strict incentives for engaging in speculative trade.

We proceed by introducing in Section 2 the economy and the relevant equilibrium concept. In Section 3 a no trade result ([Lemma 1](#)) is presented which establishes the impossibility of speculative trade whenever the agents' beliefs satisfy *ex post homogeneity*. Because *ex post homogeneity* always holds if there is an insider agent who knows the asset's true value ([Lemma 2](#)), Section 4's main result (Proposition)—stating the impossibility of insider trade in an REE—immediately follows. A stylized Goldman Sachs example illustrates the impossibility of insider trade by showing that—regardless of the agents' priors—there does not exist any REE such that Goldman Sachs could have been able to sell the CDOs to the investors. The discussion in Section 5 shows that neither impersonalized markets nor non-expected utility decision making can explain insider trade as an equilibrium phenomenon. Section 6 gives an outlook on a general equilibrium concept developed in [Zimper \(2013\)](#) in which—unlike as in an REE—boundedly rational agents may not fully understand the market clearing price mechanism to the effect that insider trade may occur in an equilibrium.

## 2. Economy

We consider an economy given as a situation of static speculation under asymmetric information. The economy consists of  $n$  agents and a single risky asset with payoff function  $X : \Omega \rightarrow \mathbb{R}$  for some finite state space  $\Omega$ . Agent's  $i$  private information is described by some partition  $\Pi_i$  on  $\Omega$ .

Denote by  $\bigvee_{i=1}^n \Pi_i$  the *join* (coarsest common refinement) of all  $\Pi_i$ ,  $i \in \{1, \dots, n\}$ , with generic element  $I(\omega)$ . Intuitively speaking, the information represented by the partition  $\bigvee_{i=1}^n \Pi_i$  obtains if all agents shared their private information, i.e., the information partition  $\bigvee_{i=1}^n \Pi_i$  stands for the full communication information available in this economy. Further, denote by  $\Sigma(\bigvee_{i=1}^n \Pi_i)$  the  $\sigma$ -algebra

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