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Do firms sell forward for strategic reasons? An application to the wholesale market for natural gas☆

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ABSTRACT

Cournot models of oligopolistic interaction in forward and spot markets have shown that firms may sell forward for *risk-hedging* reasons only, or for both risk-hedging and *strategic* considerations. Using data from the Dutch wholesale market for natural gas where we observe the number of players, spot and forward sales, churn rates and prices, this paper presents

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evidence that strategic reasons play an important role at explaining the observed firms' hedging activity. Our test for strategic behavior is based on the theoretical relationship between the number of sellers and the incentives to sell forward: if risk-hedging is the only motive behind firms' decision to sell forward, then hedging activity ought to decrease in the number of firms; otherwise, if strategic reasons are relevant, then firms incentives to sell forward should increase in the number of competitors.

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1. Introduction

The economics literature has shown that facilitating forward transactions has the potential to deliver social benefits on two accounts, namely, *risk-hedging* and *strategic commitment*. *First*, the existence of forward markets enables a firm *to hedge risks*. By fixing the terms of trade before delivery, a risk-averse firm mitigates its exposure to price shocks in the spot market. Central results in the literature relate to the decisions of a competitive risk-averse firm facing price uncertainty (see e.g. Baron, 1970; Holthausen, 1979 and Sandmo, 1971). In the absence of a futures market, price risk leads a competitive risk-averse firm to restrict its output relative to what the firm would produce under certainty. The opening of a forward market restores the level of output that would prevail if uncertainty were removed.

Second, forward markets can deliver further social benefits in situations where firms wish to sell forward for *strategic* reasons. In their influential paper, Allaz and Vila (1993) show that, even if there is no uncertainty at all about future market conditions, Cournot firms have incentives to engage in forward trading. The idea is that by selling futures contracts at a pre-specified price, a firm ends up attaching a lower value to a high spot market price thereby effectively committing to an aggressive behavior in the spot market. This raises firm profitability, because competitors respond by adopting a compliant spot market strategy. Selling forward exhibits however the characteristics of a prisoner's dilemma. Because every seller has incentives to sell (part of) its output forward, the resulting equilibrium aggregate production is higher (and the price lower) than in the absence of a futures market.

Notwithstanding the fact that the Allaz and Vila result relies on a number of particular assumptions, when restructuring electricity and natural gas markets, it is widely held that spot markets must necessarily be complemented with forward markets (e.g. Ausubel and Cramton, 2010; Borenstein, 2002; Bushnell, 2004).[1] In an attempt to aid firms to contract

[1] The pro-competitive role of forward contracting has been disputed by several authors. For example, Mahenc and Salanié (2004) demonstrate that selling forward may have anticompetitive effects when firms compete in prices instead of quantities. Liski and Montero (2006) find that the forward institution increases the likelihood with which firms can sustain collusive outcomes. Holmberg and Willems (2012) show that

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