

# Producers' Preference for Price Instability?

Andrew Schmitz

Department of Food and Resource Economics, University of Florida, Gainesville, USA

Email: [aschmitz@ufl.edu](mailto:aschmitz@ufl.edu)

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## Abstract

The debate over whether producers prefer price instability to price stability continues, especially where policies are often endorsed that aim at generating stability. Such policies include the holding of agriculture commodity stocks by government to bring about price stability. But why would producers support such a policy given that producers prefer price instability, or do they? Oi argues that producers prefer price instability, which is opposite to the conclusion reached by Massell. In this paper, we take up the issue as to producers' preference for price instability using the classic welfare economic framework used by Massell and Just *et al.* We develop a producer price expectation model that brings about price stability, which is possible without storage. We use this as the basis upon which to compare price stability to price instability. Our conclusion is that producers prefer price instability regardless of whether it is due to demand or supply shocks.

## Keywords

Price Instability, Producer Preferences, Storage

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## 1. Introduction

Schmitz and Kennedy [1] and Kennedy *et al.* [2] provide evidence that, at least in less developed countries, there is support for the government holding of commodity stocks to bring about price stability. But why would producers support such a policy given that producers prefer price instability, or do they? Oi [3] was the first to demonstrate that producers have a preference for price instability as opposed to price stability. Later, Massell [4] showed cases where the opposite result holds. In this paper, we show why both cases are possible. In comparing the results, Oi does not discuss how price stability could be achieved, but rather he assumes that the stable price in his model is given exogenously. On the other hand, Massell uses government holding of stocks to bring about price stability. One of the reasons why the findings on the preference for price stability appear

contradictory is that it is unclear how stable prices can be achieved within the price stabilization models. In addition, the source of the price stability plays a major role. Oi considers only cases where price instability is generated by demand shocks, whereas Massell takes into account both demand and supply shocks.

In comparing producer preference for price stability versus price instability, as Schmitz [5] shows, it is not possible to use storage to create price stability, because the amount of storage needed is unavailable. Also, in the Oi case, assuming that price stability is exogenous can be misleading since it is necessary to show how price stability can be achieved endogenously. In both cases of demand and supply shocks, we develop a producer price expectation framework where price stability can be achieved endogenously. This is possible without storage. Our model provides the price stabilization case that is used to compare price stability to price instability. We reach the strong conclusion that regardless of how price instability is generated, producers always prefer price instability to price stability, except in one case where producers are indifferent between the two choices.

## 2. Price Instability and Demand Shocks

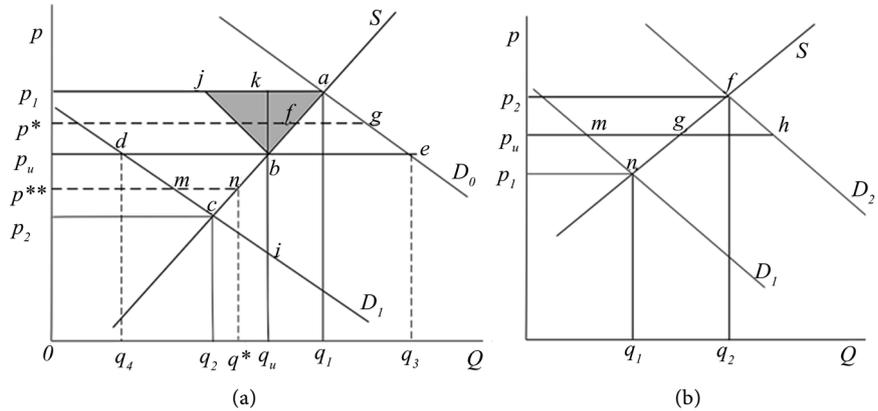
The basic argument given by Oi [3] can be found in **Figure 1(a)**. Oi confines his argument to price instability that is generated by demand shocks. Consider **Figure 1(a)** where producer supply is  $S$  and price disturbances are caused by fluctuating demands  $D_0$  and  $D_1$ . Using the Oi framework, price  $p_1$  and quantity  $q_1$  in period 1 and  $p_2$  and  $q_2$  in period 2 each occur with 0.5 probability. Oi compares these two outcomes with a two-period model where an important assumption is that price  $p_u$  is given exogenously. Within this context, Oi concludes that producers prefer price instability to stability. This is because the sum of the profits attainable for prices  $p_1$  and  $p_2$  exceed the profits at the stabilized price  $p_u$ . It follows that total revenue is also greater under instability as

$$\{(p_1 0q_1a) + (p_2 0q_2c)\} > \{2(p_u 0q_u b)\}.$$

In **Figure 1(b)**, we present the argument given by Massell [4] and Just *et al.* [6] [7] that supports Oi's contention that producers prefer price instability due to demand shocks. Price instability is given by  $p_1$  and  $p_2$ . The stable price is given by  $p_u$ . This is brought about through government storage of the amount  $gh$ . For a stable price compared to instability, producers lose  $(p_2 p_u g f - p_u p_1 n g)$ .

In Oi's model, the stable price  $p_u$  corresponds to output  $q_u$ . However, in the standard results (**Figure 1(b)**), where producer price instability is also preferred to stability, the point of comparison is very different. The stable price  $p_u$  is generated through storage ( $gh$ ). In the results given by Oi, he compares unstable prices with a stable price where he assumes that this price is given exogenously. The discussion of storage does not enter into his framework.

In the Oi framework, it is not discussed how the stable price  $p_u$  can be attained. There is no discussion on the use of storage to bring about stability. But in the Massell framework  $p_u$  is allegedly achieved through the government



**Figure 1.** Storage and Demand Shocks. (a) Demand driven price instability; (b) The standard results.

holding of stocks. However, as shown in Schmitz [5], while the result that producers prefer instability holds, prices cannot be stabilized at  $p_u$  because in **Figure 1(a)** the storage needed for this result,  $(be)$ , is unattainable given the unstable prices  $p_1$  and  $p_2$ . This is because the mean quantity produced over the two periods 1 and 2 is  $q^*$  and not  $q_u$ . Storage gives rise to prices  $p^*$  and  $p^{**}$  (**Figure 1(a)**). Thus, while the producers still gain from price instability, the magnitude of the gain can be greatly reduced. The amount is given by  $\{(p^* p_u bf) - (p^{**} p_2 cn)\}$ .

Interestingly, however, price stability ( $p_u$  in **Figure 1(a)**) can be achieved through storage but under a different producer price expectation model. Consider the case where producers expect the same price and quantity,  $p_u$  and  $q_u$  in both periods 1 and 2 (price  $p_u$  is the mean of  $p_1$  and  $p_2$  and production no longer occurs at  $q_1$  and  $q_2$ ):

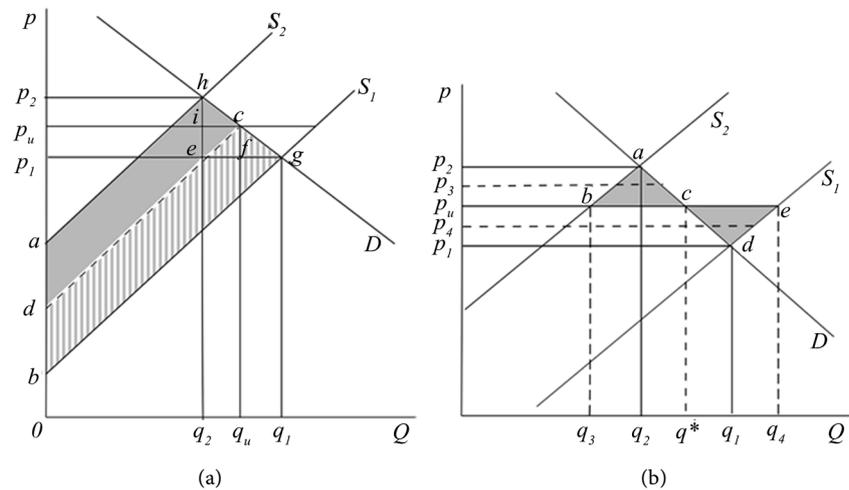
- 1) Producer price expectations in period 1 =  $\{(p_u) + \text{storage of } (q_u q_3)\}$
- 2) Producer price expectations in period 2 =  $\{(p_u) - \text{storage of } (q_u q_4)\}$

With no storage, prices fluctuate between  $p_1$  and  $p_2$ . To achieve price  $p_u$ , the amount of storage needed is  $(q_u q_3)$ , which is equal to the amount released of  $(q_u q_4)$ . We now compare producer preference for price instability versus stability. Producers prefer instability since  $\{(p_1 p_u ba) > (p_u p_2 cb)\}$ . The net gain to producers from instability is  $(jba)$  (but storage is needed to bring about price stability). Thus, even under a feasible stable price scenario, we find that producers prefer price instability to price stability.

### 3. Price Instability and Supply Shocks

Oi [3] considered only the case above, where price instability is due to demand shocks. The following discussion focuses on price instability that comes about due to supply shocks. In this case, as Massell [4] and others argue, producers prefer price stability to instability.

In the following, price instability is brought about by supply shocks  $S_1$  and  $S_2$  in **Figure 2(a)**. Demand is given by  $D$ . The expected prices and quantities are  $p_1$



**Figure 2.** Supply Shocks (a) Supply driven price instability; (b) The standard results.

and  $q_1$  in period 1, and are  $p_2$  and  $q_2$  in period 2. In the standard result **Figure 2(b)**, producers prefer price stability by  $\{(abc) + (cde)\}$ . However, like in the demand case earlier, Schmitz [5] demonstrates that  $p_u$  cannot be achieved through storage. The amount of storage from production  $q_1$  and  $q_2$ , ( $q^* - q_1$ ) gives rise to a price band of  $p_3, p_4$  (**Figure 2(b)**).

With storage, price stability ( $p_u$ ) cannot be achieved. We now derive a producer price framework where  $p_u$  can be obtained and compare this with instability of  $p_1, q_1$  and  $p_2, q_2$ . Like the demand shock model above, assume that producers have a price and quantity expectation of  $p_u$  and  $q_u$  over both periods. The price is now stable at price  $p_u$  (in this case, producers form price expectations at the mean price  $p_u$ ). Price instability must be compared to the feasible stabilized price  $p_u$ . In this case, like in **Figure 1(a)**, producers prefer price instability. However, in contrast to the demand shock model in **Figure 1(a)**, storage is not needed to bring about price stability when the price instability is generated by supply shocks. This outcome for **Figure 2(a)** is opposite to the standard result (**Figure 2(b)**), in which producers prefer price stability. Note that in **Figure 2(a)**, price  $p_u$  corresponds to  $q_u$  and not to outputs  $q_3, q_4$  as in **Figure 2(b)**.

Using a welfare economic framework to measure producer welfare, producers prefer price instability to stability as  $\{(p_1bg) + (p_2ah)\} > 2(p_u dc)$ . The net welfare gain to producers using this measure is  $\{(fq_u q_1 g) - (iefc)\}$ . The result that producers prefer price instability can be easily seen in **Figure 2(a)** as  $\{(dbgc) > (adch)\}$ . Note that if demand  $D$  is totally price inelastic, producers are indifferent between price instability and stability.

### 4. Conclusions

Oi and Massell agree that when price instability is brought about by demand shocks, producers prefer price instability to price stability. A key question in their analyses is what is the meaning of price stability? Oi assumes that the stable price to which instability is compared is given exogenously. Massell argues that

the stable price is brought about through storage. Both arguments are problematic. As Schmitz [5] shows, storage cannot bring about price stability; it can only reduce price instability. We develop a model where price stability can be achieved, but the price expectation framework that brings this about is different than the price expectation framework that generates the price instability. But even using this model as the basis to compare price instability, producers prefer price instability.

Oi did not consider price instability generated by supply shocks. Massell demonstrated that in this case producers prefer price stability over instability. The same problem arises in that the stable price used is not obtainable through storage. We develop a model where, under a different price expectation model used to generate price instability, the stable price  $p_s$  is attainable. From a comparison between price instability and price stability, producers no longer prefer price stability. At best, producers are indifferent between the two choices.

It is important to stress that in the Oi framework, reference was not made to the government holding of stocks. This discussion came about in the Massell framework, where the government holding of stocks can bring about price stability. We show that in the supply shock model, storage is not required to generate price stability.

Within our welfare economic framework, attention is not given to price uncertainty. This is a limitation that should be considered in future work and would be generally relevant for risk-averse producers. Within this context, models should be developed where the effects of shocks that are a combination of supply and demand changes in the same period are taken into account. In addition, the results in this paper should be integrated with those by Feder *et al.* [8], Turnovsky *et al.* [9], and Schmitz *et al.* [10]. Feder *et al.*, Turnovsky *et al.*, and Schmitz *et al.* show how the existence of futures markets can mitigate the need for price stabilization policies.

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