



The Impact of Monetary Policy, Transport Costs and Substitute Prices on the Australian Wheat Futures Market Price

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Abstract. This paper is going to analysis the impact of three different factors on the price of the Australian wheat futures market which might make contribute on the price model construction. According to the research in the past years, this paper gives three different factors which might be significant influence the price which is the interest rate, transport cost and substitutes' price. This paper use Hp filter to detrending the data and calculate the correlation. By analyzing the result, get the conclusion weather these three factors related to the price of the Australian wheat futures market. The conclusion is that interest rates are only weakly correlated, while the transaction cost and the substitutes' price have strong correlated to price of the Australian wheat futures market. This article helps to model the price of the Australian wheat futures market and other important related influencing factors can be further explored in the future.

Keywords: Monetary Policy · Transport Costs · Substitute Prices · Futures Market Price

1 Introduction

In the study of the futures market, we have learned that prices in the futures market are influenced by many factors. For example, supply and demand, currency factors, economic cycles, and political factors. The purpose of this paper is to demonstrate through data analysis the impact of monetary policy, transportation costs and substitute prices on the Australian wheat futures market. This analysis will help people to build a better price model for the Australian wheat futures market and to forecast its changes.

2 Literature Review

The inspiration for this article comes from a few recent interest rate hikes by the Australian government, which raised rates by 25 basis points to 2.60% on October 4 and again by 25 basis points to 2.85% on November 1. The main objective is to control or mitigate the high inflation rate in Australia. But will the successive large interest rate adjustments affect the futures market, or to what extent? Smales in 2012 showed

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that the RBA's monetary policy has a significant impact on the volatility and yield of the Australian futures market, and the shorter the maturity of the futures market, the stronger the impact [1]. Kumar in 2021 analyzed the correlation between wheat prices in India and transportation costs and local supply and demand [2]. The correlation between Szczepanska-Przekota, on the other hand, analyzed the impact of wheat spot market prices on the futures market, starting from a time series [3]. In addition to this, Crain's study gives us an insight into the significant impact of agricultural programs on both the spot as well as the futures market of wheat [4]. However, the intention of this paper is to draw conclusions from the analysis of the data itself. The changes and additions to the agricultural program are difficult to quantify and are therefore not analyzed in detail in this paper. It is worth mentioning that Karali analyzed the wheat futures market in India and found that the market is efficient but the price itself is unpredictable [5]. Jian Yang and David J. Leatham analysed the U.S. wheat futures market and found that in the long run, wheat futures market prices are relatively balanced and there is no price convergence in the wheat futures markets of different countries [6]. Cinar, Gokhan's study shows that there is a cointegration relationship between spot and futures prices of wheat, in other words, there is an equilibrium relationship between them [7]. When it refers to the Australian futures market, Turkington, J & Walsh, D study tells us that electronic markets have enhanced price discovery in the current environment, but price discovery is still very slow. Simply put, the Australian futures market is not very well developed [8]. The study by Alam, MR & Gilbert provides the idea for the analysis in this paper, using a rich data set and a VAR framework, they conclude that macroeconomic shocks play a very important role in price dynamics [9]. Fonseca-Cifuentes et al. identified the large impact of interest rates on the future price of Colombian brown potatoes by using methods such as significance tests and OWMA. And both potatoes and wheat are bulk commodities with certain common characteristics [10]. Therefore, the model currently developed does not explain 100% of the behaviour of price changes in the wheat futures market. With the various previous studies, this paper intends to apply their ideas and perspectives further to the Australian wheat futures market. The impact of monetary policy and transportation costs on the futures market is demonstrated through the analysis of data. In addition, it is understood through microeconomic knowledge that changes in the price of substitutes can affect the price of the product. This paper also uses data to demonstrate whether this idea can be successfully applied to the Australian wheat futures market.

3 Materials and Methods

This analysis part is divided into three parts:

1. The first part is the analysis of the correlation between interest rates and the price of the Australian wheat futures market.
2. The data of the price of the Australia wheat futures market comes from the ASX
3. The data of the interest rate of Australia comes from the FRED.

First, it is necessary to detrend the data. Detrending refers to the removal of trends or long-term changes in the data in statistical analysis, leaving the remaining data to

contain only short-term fluctuations or noise. This method is usually used to analyze time series data. Detrending also helps us to analyze correlations between data. If there is a long-term trend between two data, then even if these two data show an inverse change in the short term, they may be mistakenly considered to be positively correlated. Therefore, detrending can help us analyze the correlation between data more accurately.

In this paper, HP filter is used to detrend the raw data. The Hodrick-Prescott filter (Hp filter for short) is a commonly used time series data analysis method for detrending. It was proposed by economists R. J. Hodrick and E. C. Prescott in 1997. Use HP filter is a good way to detrend the raw data. HP filter can separate the periodic part from the original data and obtain a smooth curve to represent the whole time series, i.e., data that are more sensitive to short-term fluctuations are transferred to a representation that is more sensitive to long-term fluctuations. There are two reasons for using Hp filter: 1. it is very easy and convenient to use because it can be used directly in excel. 2. it can retain more short-term fluctuations: Hp filter is implemented by minimizing the loss function, which is determined by the mean squared difference between the difference of the time series data and the long-term trend estimate. Therefore, Hp filter can retain more short-term fluctuations, which makes the analysis results more accurate. And then calculate the correlation between the interest rate and the price. And the correlation is 0.222547. It shows that the correlation is very low. It does not very strange. Australia accounts for about 3% of total global wheat production (ranked 7th in the world) but 10%-15% of total global wheat exports (ranked 4th in the world). In such special situation, I try to use the interest rate of America to retry analysis. This paper use One-Year U.S. Treasury Bonds interest rate to represent the interest rate. The data of the interest rate of American comes from FRED. Use the same way to calculate the correlation between the interest rate of America and the price. The correlation is -0.287171129 whose absolute value is larger than the interest rate in Australian. But it shows that interest rate of American has negative correlation with the price of the Australia wheat futures market.

The second part is to analysis the relationship between the transportation costs and the price of the Australia wheat futures market. The data of the transportation costs is significantly difficult to get. However, the price of oil and transportation costs are closely related. This paper will use the price of the oil to present the transportation. Use the detrending data to fit the model and calculate the correlation. Through the calculation of the correlation, I get that it is 0.696080432 which is a very large value than the last part which focus on the interest rate. From the Fig. 1, it is easily to see that they have similar moving trend.

This paper is going to analysis the relationship between substitution and the price of the Australia wheat futures market. It is easily to associate with rice which is also one of the main staples of people's staple. This paper uses the global price of rice, Thailand to represent the price of substitution. This data also comes from the FRED. Their correlation is 0.55217525 which is large enough to illustrate they are related to each other.

Figure 2 also shows that the correlation between the price of rice and the Australian wheat futures market is very large.

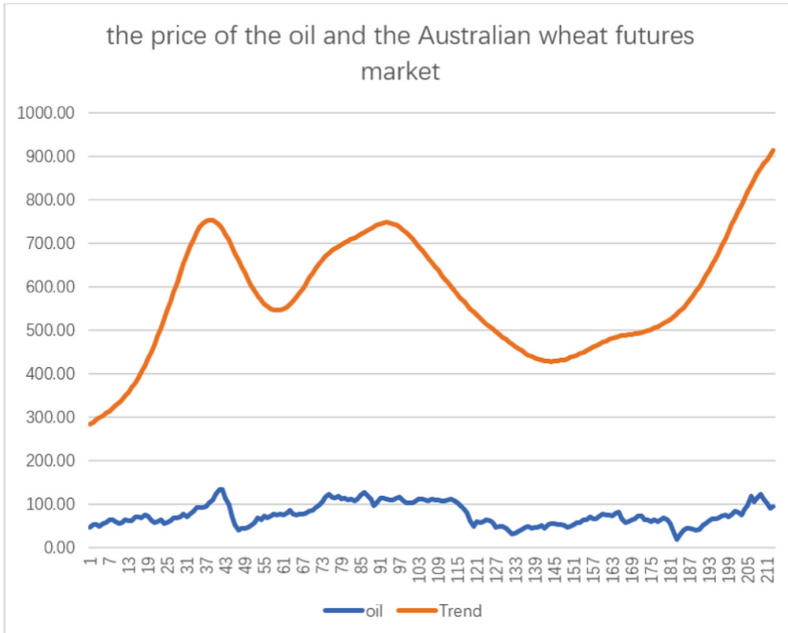


Fig. 1. The price of the oil and the Australian wheat futures market

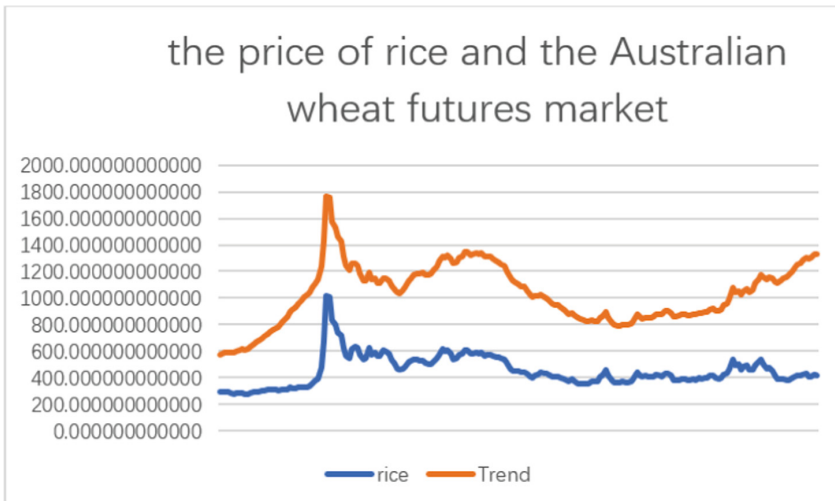


Fig. 2. The price of rice and the Australian wheat futures market

4 Conclusion

Next comes to analysis the result from the last part. As for the result of the correlation between the price and the interest rate in America, it is not surprising that it is negative.

When interest rate goes down, more funds come out from the bank into the market which will stimulate the real economy. By this way, it will increase the price of the wheat which is a part of the real economy. Furthermore, the price of the futures market is closely linked to the spot price.

For the result of 0.696080432. It significantly shows that the price of oil and the price of wheat are strong related and homotropic. It illustrates that when the price of the oil goes up which means the transaction cost goes up leads to the price of the Australian wheat futures market goes up.

According to the results of the last part, the correlation between the price of the rice and the price of the Australian wheat futures market is 0.55217525 which also shows that they are strong related. But it is very strange that their correlation is positive. If we assume that they are substitutes to each other, their correlation should be negative. Since once the price of the rice goes up, the demand for the wheats will goes up which lead to the increase the price of the wheats. To explain this phenomenon, the solution of this problem is that people use other substitutes which might cause some other complex effects.

In conclusion, the interest rate of Australian has weak relationship to the price of the Australian futures market, while the interest rate of American is more related to it and shows a negative correlation. As for the transaction cost and the price of the substitutes, they both show a strong related to the price of the Australian futures market and positive correlation.

4.1 Limitation

This paper has lots of limitation. The most important limitation comes from the poor development of Australian futures market. Due to the late start of the Australian futures market, only partial data from 2005 onwards are available, and the small volume of data is likely to lead to incomplete analysis. More robust research needs more data to back it up. In terms of the data itself, it is highly variable, further reflecting the instability of the Australian futures market. There are certainly some factors influenced by special events, but the magnitude of the variation is still large compared to other data. Furthermore, this paper can not list all the important factors that can influence the price of the Australian wheat futures market. Others require further research to argue for correlation. Another limitation is that this paper can not explain the reason why rice and wheat are substitutes for each other, but their correlation coefficients are still positive.

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