

Bids, Offers and Clearance Under Zero Flux

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A mechanical expansion on the essay 'Trade' Today by Sandeep Jaitly

<https://purelytheoreticalresearch.com/upload/Trade-today.pdf>

In Andalusia, Seville oranges grow abundantly on the streets in some of its towns and cities. Many of which fall to the ground leading to wastage and littering of the streets. Seville oranges are regarded as one of the finest marmalade fruits of all; their peels can also be dried for use in fireworks. Collecting and bringing Seville oranges to market would solve issues with littered streets while providing preservable fruit to those who have need for it. The presence of a market maker could facilitate collection and consumption by accepting Seville oranges in exchange for copper and vice versa.

On the premise that one should not profit from the labour of another, market makers are to ensure zero change across their table. Each offer made against given quantities can be complemented by a *counter offer*.

1oz Copper for 12oz Seville Oranges

is countered by

12oz Seville Oranges for 1oz Copper

However, a single offer and its counterpart may not be desirable to those who have oranges and want copper, or to those who have copper and want oranges. To encourage exchange, our market maker will make *many* offers at various quantities.

1 for 18 // 18 for 1

1 for 16 // 16 for 1

1 for 14 // 14 for 1

1 for 12 // 12 for 1

1 for 10 // 10 for 1

Marie lives nearby to a bountiful orange garden in Seville. She collects 52oz of Seville oranges and brings them to our market maker to exchange for copper. She first takes the

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offer of '1 for 12', thus setting the price. Our market maker subsequently changes his initial quotations to reflect this interactionⁱ.

$$\begin{aligned}
 &18/_{12} \text{ for } 18 // 18 \text{ for } 18/_{12} \\
 &16/_{12} \text{ for } 16 // 16 \text{ for } 16/_{12} \\
 &14/_{12} \text{ for } 14 // 14 \text{ for } 14/_{12} \\
 &\quad 1 \text{ for } 12 // 12 \text{ for } 1 \\
 &10/_{12} \text{ for } 10 // 10 \text{ for } 10/_{12}
 \end{aligned}$$

After first taking '1 for 12', Marie further takes '16/12 for 16', '14/12 for 14', and '10/12 for 10'—*decreasing* her total balance of oranges by 52oz; and *increasing* her balance of copper by 4 1/3oz. Further, Miguel takes '18 for 18/12' to make his traditional winter marmalade.

$$\begin{aligned}
 &18/_{12} \text{ for } 18 // 18 \text{ for } \frac{18}{12} \\
 &\frac{16}{12} \text{ for } 16 // 16 \text{ for } 16/_{12} \\
 &\frac{14}{12} \text{ for } 14 // 14 \text{ for } 14/_{12} \\
 &\quad 1 \text{ for } 12 // 12 \text{ for } 1 \\
 &\frac{10}{12} \text{ for } 10 // 10 \text{ for } 10/_{12}
 \end{aligned}$$

To maintain zero flux, our market maker could exchange 52oz of Seville oranges for 4 1/2oz copper, and 1 1/2oz copper for 18oz of Seville oranges. Where markets for copper and Seville oranges exist, complimentary offers to those taken can be displayed to reflect this goal.

$$16 \text{ for } 16/_{12} \mid 14 \text{ for } 14/_{12} \mid 12 \text{ for } 1 \mid 10 \text{ for } 10/_{12} \mid 18/_{12} \text{ for } 18$$

Suppose another market maker—at the same locality—concurrently makes offers of **steel** against **copper**. Some of which have been taken by other individuals prior.

$$\frac{15}{10} \text{ for } 15 // 15 \text{ for } 15/_{10}$$

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~~1 for 10~~ // 10 for 1

$\frac{5}{10}$ for 5 // ~~5 for $\frac{5}{10}$~~

Again, given the appropriate markets for all our market makers' goodsⁱⁱ, all complementary offers could be placed into one single display to those outside locality.

16 for $\frac{16}{12}$ | 14 for $\frac{14}{12}$ | 12 for 1 | 10 for $\frac{10}{12}$ | $\frac{18}{12}$ for 18

$\frac{5}{10}$ for 5 | 10 for 1 | 15 for $\frac{15}{10}$

If by happenstance the following exchange were to occur, all tables could be cleared.

52 and 2 and 25 FOR 18 and 5 and $6\frac{5}{6}$

However, where quotations are given only in coins of a particular weight and finenessⁱⁱⁱ, exchanging copper for copper/steel for steel may not be necessary. Indeed, net quantities alone could be adequate for clearance.

34 and 20 FOR $4\frac{5}{6}$

The simple exchange of 34oz of Seville oranges and 20oz of steel for $4\frac{5}{6}$ oz of copper could clear *all* market makers' tables were it to happen. But how does one exchange fractional quantities such as $4\frac{5}{6}$ oz when only 1oz coins are available?

Money

Assume a market participant has many 1oz copper and steel coins and wishes to acquire Seville oranges. Seville oranges are quoted only in 1oz copper coins and so he takes the following offers (from the display above).

14 for $\frac{14}{12}$ | 16 for $\frac{16}{12}$

which can be resolved into

30 FOR $2\frac{1}{2}$

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Of course, $2\frac{1}{2}$ oz copper cannot accurately be cleared using 1oz coins. But by taking a further offer of ' $\frac{5}{10}$ for 5', improvements can be made.

14 for $\frac{14}{12}$ | 16 for $\frac{16}{12}$ | $\frac{5}{10}$ for 5

can be resolved into

30 and $\frac{5}{10}$ FOR $\frac{30}{12}$ and 5

simplified into

30 FOR 2 and 5

30oz of Seville oranges could be exchanged for two 1oz copper coins and five 1oz steel coins—completing three of our collective's offers.

Futures Under Zero Flux

Suppose Marie wishes to exchange copper for March Seville oranges. By early spring she expects plenty of storage space in her pantry and so hopes to fill it with seasonal fruits, at a price agreed now. She first takes our market maker's offer of 'Mar16 for 1'. Subsequently, Miguel intends to go orange picking at harvest time and sells forward Seville oranges: taking ' $\frac{14}{16}$ for Mar14' and ' $\frac{10}{16}$ for Mar10'.

$\frac{18}{16}$ for Mar18 // Mar18 for $\frac{18}{16}$

1 for Mar16 // Mar16 for 1

~~$\frac{14}{16}$~~ for Mar14 // Mar14 for $\frac{14}{16}$

$\frac{12}{16}$ for Mar12 // Mar12 for $\frac{12}{16}$

~~$\frac{10}{16}$~~ for Mar10 // Mar10 for $\frac{10}{16}$

To exchange March Seville oranges for spot Seville oranges (carry), the following could be made:

12 for 1 | 1 for Mar16

can be resolved into

12 FOR Mar16

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The carry is *negative*

To exchange spot Seville oranges for March Seville oranges (de-carry), the following could be made:

$18/12$ for 18 | Mar10 for $10/16$ | Mar14 for $14/16$

can be resolved into

Mar24 FOR 18

The de-carry is *positive*

Seville oranges are in *contango*

The presence of multiple market makers from distinct localities, displaying differing prices, could assume more complex formations. Consider the following offers from two market makers who happen upon each other but both seek compliments at a given locality.

Market Maker 1

1 for 15

1 for Mar17

Market Maker 2

13 for 1

Mar16 for 1

To carry: The bid for March Seville oranges is '1 for Mar17', the offer for spot Seville oranges is '13 for 1'. The carry is negative.

To de-carry: The bid for spot Seville oranges is '1 for 15', the offer for March Seville oranges is 'Mar16 for 1'. The de-carry is positive. Seville oranges are in *contango*.

ⁱSuppose Marie first takes the offer of ‘1 for 16’ in lieu. Should this occur, our market maker’s offers can be adjusted as follows.

$18/16$ for 18 // 18 for $18/16$
~~1 for 16~~ // 16 for 1
 $14/16$ for 14 // 14 for $14/16$

Indeed, quantities of copper received for a given amount of Seville oranges would be less than if ‘1 for 12’ was first taken. Just which offer is initially taken depends on the individual’s requirements. Perhaps they do not wish to be burdened with large quantities of copper/Seville oranges, or have use only for particular quantities of each good, etc.

ⁱⁱFor example, markets at a particular location and at a particular point in time may be fully complementary with the exception of Seville oranges. Here, offers of steel against copper may still be displayed but offers against Seville oranges are omitted.

ⁱⁱⁱ“[T]wo 1/2 unit gold coins do not ‘equal’ a unit gold coin” (S. Jaitly, Cost and price). Further, unit coins may be quoted against fractional coins by another market maker, which could also be taken in some exchange. (Jaitly, S. <https://purelytheoreticalresearch.com/upload/Cost-and-price.pdf>)