

Price Convergence in Futures Markets

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One of the primary advantages of a futures market is to provide hedgers with an instrument, which enables them to offset potential risks they may face in cash markets. The hedging effectiveness of a futures contract depends upon the extent to which the contract is able to accurately reflect the underlying market. This can be judged by how efficiently the contract ensures price convergence. The main purpose of this article is to highlight the role that price convergence plays in a futures market, and in doing so it attempts: to define price convergence; to outline the process through which it occurs; and, to briefly highlight structural mechanisms which can be used by an exchange to assist in proper price convergence.

For a better understanding of convergence, we must first understand what is meant by “cost of carry”. There are various costs incurred while holding an underlying asset from the present to a predetermined future date, such as storage, insurance, and interest costs used to finance the asset, which in totality form the “cost of carry.” The cost of carry and the cash price, of the underlying, serve as primary referents for the futures price. Price convergence refers to the process by which the futures price gradually converges to the contemporaneous spot price of the underlying, as a contract nears expiration. This relationship, between the cash and futures market, is defined by price interactions in the two markets.

The aforementioned price relationship needs to be further explicated in order to explain the actual process that drives convergence. A viable start would be to examine the price interactions between the cash and futures markets. In a normal market, cash prices are generally lower than futures prices. Consider the example: where the cash price of the underlying, plus its cost of carry, is higher than the near futures delivery month price. Individuals would prefer to

purchase futures contracts for the underlying, rather than buying the asset in the cash market and carrying it forward a month. This creates excess demand for futures contracts in the near delivery month, causing the futures price to rise and the cash price to fall. The two prices would subsequently rise and fall until they reach equilibrium. Conversely, if the futures price is higher than the sum of the cash price and the cost of carry, the opposite would occur.

The equilibrium condition, mentioned above, entails that the price difference, between the price of the underlying in the cash month and the near futures month is equal to the cost of carry of the underlying, so that prevalent prices will be such that arbitrage is precluded.

A further extension of this price relationship can be used to deduce how convergence occurs. As expiration nears, the cost of carry of the underlying falls and at expiration equates to zero, since at expiration there should, in principle, be no difference between the cash month and the futures month. Prices are now said to have “converged”; although the futures market and cash market are still separate entities, their prices have moved in equilibrium such that the two markets have effectively become one.

The model of price convergence, described above, implies that any price discrepancies between the two markets will quickly disappear, assuming arbitrage is potent enough. In reality, however, short-lived mispricings, as in the case of speculative bubbles, for example, may exist. Excessive speculation and price manipulation are recorded as the primary factors influencing nonconvergence. Exchanges can play important roles in facilitating convergence, by assisting in arbitrage, serving as a channel for liquidity and transparency, keeping price manipulation at a minimum, and curbing excessive speculation. They can incorporate within their contracts structural mechanisms and design criteria, such as: the credible threat of delivery, the imposition of a variety of margins, and position limits, that facilitate proper price convergence.

With cash settled contracts, convergence is automatic. The mechanism of delivery, however, for physically settled contracts, is the essential force that drives convergence and ensures that a definite price relationship exists between the two markets. The mere facility that enables market participants to make or take delivery will ensure that upon expiration the futures price will converge to the cash price, since traders must be able to buy in one market and sell in another, or vice versa. In the absence of delivery, any connection between futures and cash prices is redundant, since it would be pointless to “track” the underlying, without insuring delivery or convergence. Delivery, in theory forms the crucial link between cash markets and markets derived thereof.

Moreover, the threat of delivery must be credible enough to prevent defaults, resulting from ambiguity in delivery provisions. Credible threat of delivery is further important because it lends liquidity to the two markets, since it reminds the trader that the *obligation* entailed in a futures contract, to make or take delivery, cannot be taken for granted. This ensures that the trader is driven to either close out his position, before delivery date, or partake in necessary cash transactions to cover his positions, providing liquidity to the cash and the futures markets. Impediments to delivery are the primary causes of illiquid markets and nonconvergence; exchanges must therefore ensure that all deterrents to delivery are removed.

Margins can additionally support the fundamental facility of delivery. Since a futures contract is essentially only “a promise to pay,” and not an asset, traders of these contracts need only pay a *margin* to acquire such contracts. Spot margins are special margins that can be used to force delivery. Spot margins are characterized by a sharp increase in margin requirements of open accounts nearing delivery date. They set in, approximately, five to ten business days before expiration of a contract and are levied, so that only participants serious about delivery stay within

the market. With the focus on ensuring delivery, spot margins additionally facilitate price convergence.

Furthermore, the enforcement of spot margins provides liquidity to cash and futures markets. To better gauge his economic interests, a trader will attempt to assess whether the return on keeping his position open exceeds the return offered in the cash market; if so, he will keep his position open and closes it if the reverse is true. This lends liquidity to the two markets, because a trader will expend resources to “discover” the best available prices in the market and in doing so profit opportunities will be quickly expended. Convergence is additionally facilitated, because price discovery increases the increased likelihood of finding risk-free arbitrage opportunities. Price discovery and position assessment should ideally be a continuous process, covering the entire period a position is maintained. The implementation of spot margins, however, serves as the crucial point which *forces* a trader to forecast his expectations of the future and take action.

Another important feature of contract design that significantly affects price convergence is the implementation of position limits. The exchange has the ability to effectively limit the number of contracts that can be entered into by a trader. Position limits prove to be extremely effective tools in the prevention of possible price manipulation and in the protection of futures markets from excessive speculation that can cause sudden or unwarranted price fluctuations.

The key element in the imposition of position limits is to ensure that market participants are as diverse as possible. They attempt to restrict the influence of a single market participant on the overall movement of prices. In the absence of position limits, a market participant can effectively “corner the market,” thus exerting influence not only on the futures market but the cash market as well, since he would need to make large transactions in both markets, to

effectively hedge his position. Subsequently, his actions would wield influence on price movements in both the markets, making convergence, in the absence of position limits, exceedingly susceptible to manipulation.

There is a continuous flow between the cash and futures markets. Even though delivery is the main facility through which a contract ensures price convergence, we have explored other measures an exchange can use to additionally support this fundamental utility. Mispriced contracts and nonconvergence can hinder the use of a futures contract as an efficient hedging tool. Worldwide, about seventy five percent of all contracts fail due to their inability to accurately reflect spot market conditions; therefore, it is imperative that an exchange provide adequate measures to foster price convergence and ensure that its contract meets efficient design criteria, for success of its contract.