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# **STAFF PAPER SERIES**

## **Boom and Bust in the '90s: The Story as Told by Corn**

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## Boom and Bust in the '90s: The Story as Told by Corn

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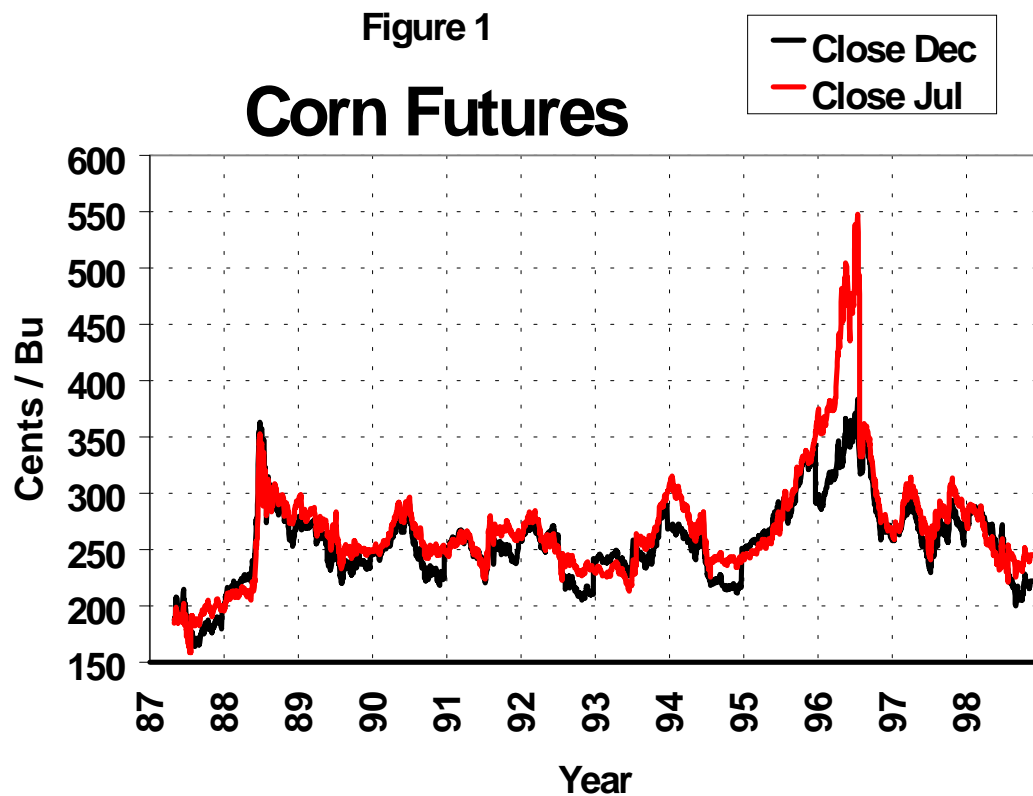
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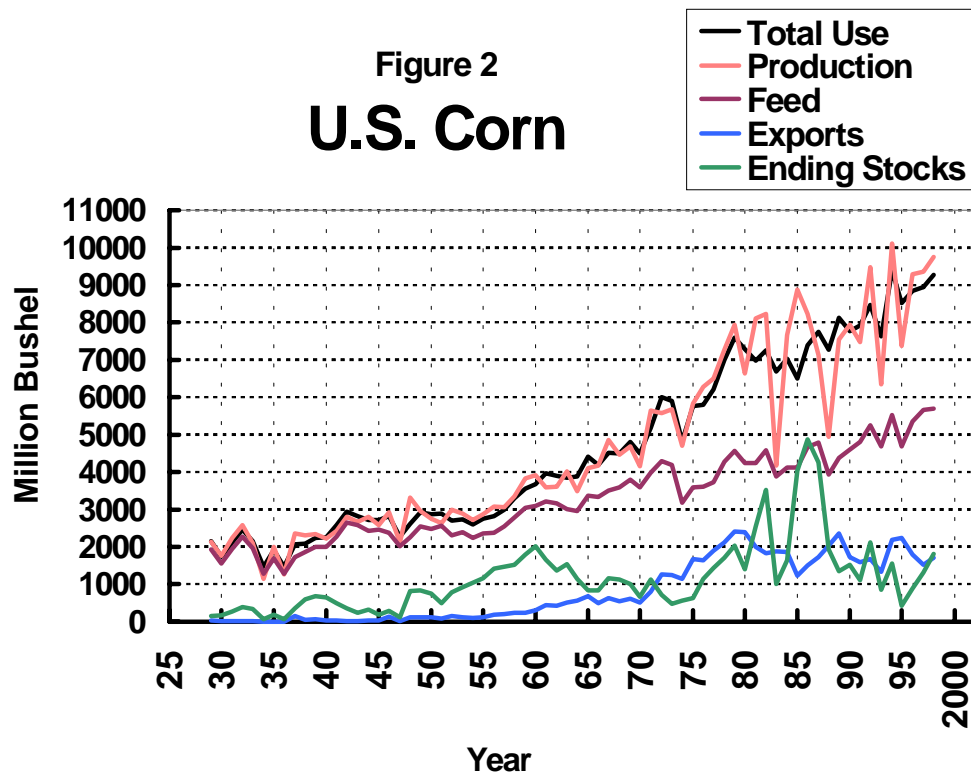
## Introduction

In the fall of 1994, China announced that it was withdrawing from the corn export market. This marked the beginning of a four-year boom-bust cycle in the mid-western corn market. Here we trace the market making events behind the boom to historic highs in the spring of 1996-- China, weather, and farmers trapped by "hedges." The bust results from the three production years that have followed with somewhat normal U.S. weather and with most planting limitations removed. Prices are now all the way back down to where it started just four years ago.

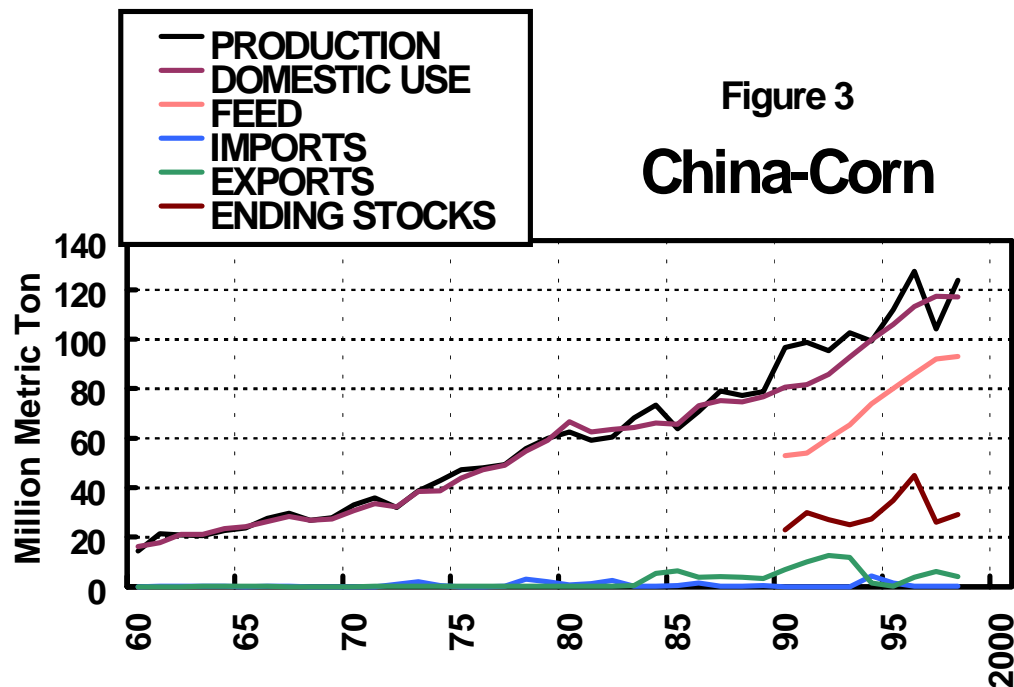


### The Stage is Set

Over the past 10 years, corn futures prices have been in the low to mid-\$2 area most of the time (see Figure 1). Prices have been able to briefly rise above this basic level when projections for corn ending stocks (national corn inventory just ahead of the harvest of a new crop) dwindle to something less than 1 billion bushel (see Figure 2). Usually this is the result of a weather shock that sharply, but only temporarily, reduces new crop supplies. The 1994 corn crop was a 10 billion bushel bin buster. A new record was set with national yields almost 7 percent higher than anything that had ever been seen before. In November 1994, USDA projections for corn ending stocks were a comfortable 2 billion bushels, plus suggesting that prices would remain near the bottom end of the range for some time.



Then in early-December, China announced that it would ban exports and increase imports of corn to fight inflation related to its domestic grain shortages. Prices started rising. Over the previous four years, China had aggressively expanded its corn exports to about 465 million bushels per year (see Figure 3). This had been hard on U.S. corn exports that previously had been able to exceed 2 billion bushels in the late-1980s. Getting this market back was good news indeed. Interest in the emerging China rose along with corn prices. Double-digit rates of Chinese economic growth suggested strong demand for better diets. The possibility for a demand-driven era of better prices was interesting to contemplate. It seemed different than just another weather shock to the supply side.



Still, close examination of available data on Chinese corn fundamentals raised doubts. It was not difficult to be skeptical. After all, the Chinese withdrawal from the world corn export market had the tone of a one-time shock, not unlike weather shocks that have had only a short-term influence toward higher prices. This particular shock at approximately 400 million bushels, or 4 percent of a 10 billion bushel crop, was not large in comparison to historical supply side weather shocks, where yields have been reduced by as much as 25 percent. The argument for a new era of better prices needed to find stronger justification in terms of new emerging Chinese demand; that is potential for China to become a major importer.

By late-1994, China had already been experiencing double-digit rates of economic growth since the late-1980s. Yet, the underlying growth trend of Chinese corn demand during the early-1990s was, at best, in the vicinity of 300 million bushels per year, 3 percent of a 10 billion bushels U.S. corn crop. While not a large number, it was important inasmuch as it reflected the potential for growth in the U.S. corn export market. A market growing at the rate of 3 percent per year is noteworthy. If it reflects permanent structural change in world corn trade patterns, it projects well for a strong corn market after a little time goes by. On the other hand, the growth component of Chinese corn production needed to be recognized as well. It was expanding at well over half the growth rate of Chinese corn demand. With Chinese yields well below U.S. levels there was and is room for Chinese production to continue to grow just from improved yields. So skeptical arguments were not difficult to find.

Nevertheless, from December 1, 1994, to June 1, 1995, December 1995 corn futures prices rose by about 35 cents mostly on enthusiasm about these new Chinese focused prospects. At \$2.80, at this time, the price reflected and reinforced the view held by some that a new era of strong U.S. corn prices had, indeed, arrived. But it also reflected to some extent expectations for

a more moderate 1995 crop. A 7.5 percent acreage reduction program was operating in corn. This, along with more normal yields versus the 1994 historically record yields, suggested about an 8.6 billion 1995 crop--roughly 15 percent less than the record 1994 crop.

From June 1, 1995, to December 1, 1995, old crop corn futures rose about another 50 cents a bushel. This component of the 12-month increase was mostly the result of trouble with the U.S. corn crop. The China-based enthusiasm would have to wait awhile to be unmasked. Regions of the south central Corn Belt were planted very late. Two brief heat waves, one in late-June and another in July, took away from crop potential. Corn borer infestations were severe in some regions. Yield estimates were repeatedly revised lower throughout the second half of 1995. By November, the U.S. corn crop was estimated to be 7.4 billion bushels, 2.7 billion bushels (27%) less than the 1994 crop. Corn was again scarce.

### **The Price Dynamics of Historic Highs**

In the price explosion of the 1970s, corn established fresh historic highs in October 1974, slightly over \$4 per bushel. Thereafter, the \$3.50 to \$4.00 price level came to represent the loose upper bound, sort of a "glass ceiling," where extra selling by corn producers was unleashed. Bull markets in corn have a live cycle with the various phases revealed best by the participation of speculators and commercials. The best data that is available to analyze these relative participation rates come from the Commitments of Traders Reports maintained and released by the Commodity Futures Trading Commission. It categorizes the open interest (the quantity of existing futures positions) into long (virtually bought), short (virtually sold) and spread (long in one and short in another futures contract) positions. Long and short positions are further segregated by reportable speculators (non-commercial accounts where the position exceeds 750,000 bushels, commonly



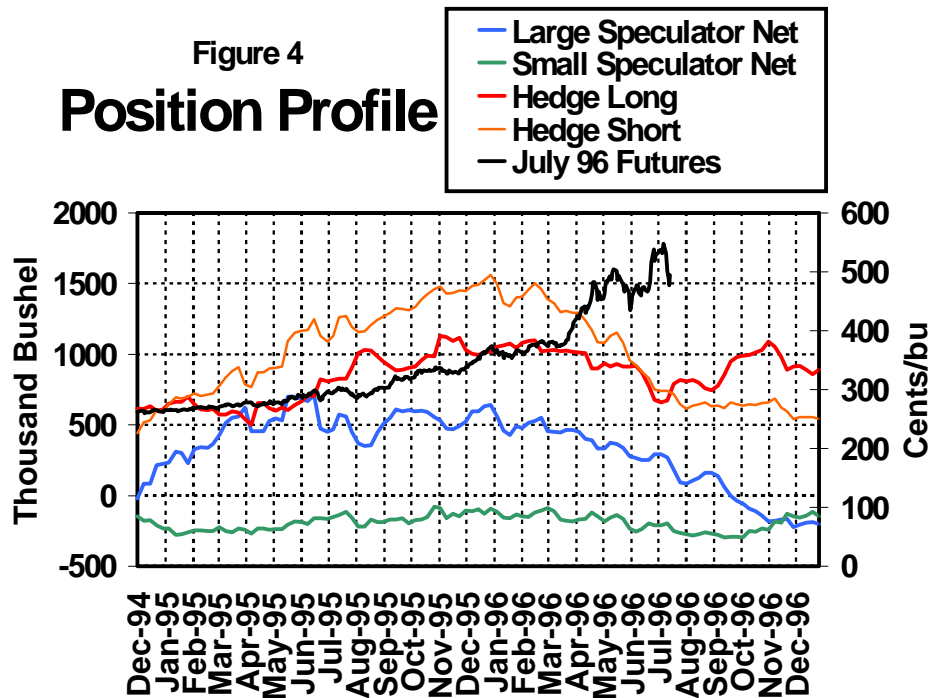
referred to as the "futures funds"), non-reportable accounts (accounts where the position is less than 750,000 bushels, commonly referred to as small speculators), and commercials (hedge accounts where positions exceed 750,000 bushels). Short commercial positions mostly reflect aggregate farmer commitments to sell, and long commercial positions reflect mostly aggregate end user commitments to acquire.

In typical markets, local sales by farmers are somewhat accommodated by local purchases by end users. Inasmuch as this local balance is not perfect, the excesses from either side become reflected in futures positions. Examples: If local farmer sales exceed local end user demand for a particular time window, the excess is hedged as sales in the futures market. If local end user demand exceeds farmer sales for a particular time window, the excess is hedged as a purchase in the futures market. Therefore, the commercial open interest in the futures market tends to reflect the degree of spatial and temporal dislocation of buying and selling interest of producers versus end users.

In 1995 corn prices marched higher month after month all year long. The market was characterized as a demand-driven market and, in that sense, something of a different quality than had been experienced since the 1970s. It was fun to label it in parallel to the battery rabbit commercial--"It just keeps going."

As prices moved higher, farmer selling was stimulated. Short commercial open interest rose steadily from late-1994 to very early-1996 (see Figure 3: Hedge Short). Who was buying? First, it was the funds (see Figure 4: Large Speculator Net). Later in the year, it was the end users (see Figure 4: Hedge Long). The small miscellaneous accounts were gradual buyers all year long as reflected by a shrinking net short position (see Figure 4: Small Speculator Net). In brief,

early in the year speculators bid prices to levels that attracted the necessary farmer sales to let them in. Later in the year, end-users were aggressive defensive bidders.



It is noteworthy that the long open interest held by large funds rose from about 0 to slightly over 700 million bushels (see Figure 4: Large Speculator Net). This was a record long position in comparison to similar situations historically, where long funds positions seem to reach full potential at about 350 million bushels. It is my opinion that this new level was attainable mainly because of a rule change on March 31, 1994, that expanded the maximum corn position that could be held by a speculative entity from 15 to 30 million bushels. I doubt that it is coincidental that the full expression of interest to own corn at 700 million bushels was about twice

the 341 million bushels level registered in the bull market cycle associated with the Midwestern floods of 1993.

It is interesting to notice that the late-1995 price level was in the vicinity of the "glass ceiling." On the last trading day of 1995, July 1996, corn futures were at \$3.68. These price levels had unleashed the necessary farmer selling to let in the speculator early in 1995 and relieve the anxiety of the end user late in 1995. It is also noteworthy that farmers that had sold at these glass-ceiling prices were especially enthusiastic about what they had done. Enthusiasm for some was intense enough for them to contemplate selling more than the 1995 crop. Locking in good prices for future crops was (correctly in my opinion) on the mind of some good and aggressive managers.

### **A Digression: Marketing Multiple Crops and the Rolling Hedge**

I recall that in my extension marketing work during the early-1990s, a question that was often raised by experienced and aggressive grain marketers involved locking in good prices for futures crops (plural emphasized) when prices were good, inasmuch as good prices never last very long. After most, myself included, agreed that this was worth considering as part of a long-term grain marketing strategy, the discussion turned to techniques and tradeoffs. A negative consideration focused on the margin burden to working capital associated with carrying hedges on the books for years at a time. Another discussion focus involved the myriad of futures contracts available to use to place the hedge. Stripped to its most basic form the important choice involved hedging future production using futures contracts that preceded or followed the harvest of the particular crop being hedged.

For example, in late-1995 the 1996 crop could have been hedged in December 1996 futures, the 1997 crop could have been hedged in December 1997 futures, etc.; that is, futures that followed harvest were available for hedging the next several years of production. On the other hand, in the early-1990s the use of futures that preceded harvest had generated favorable results to many that had used this rolling hedge technique. Application against 1996 production would involve selling the July 1996 futures contract against 1996 production prospects, and then before the July futures contract expired, roll (buy July futures and sell a more distant futures contract) it into a futures contract that followed the harvest of the 1996 crop. If in the timeframe that the July futures contract was held it were to decline by more than the more deferred contract, it would reward the hedge by the amount of this extra decline.

The rolling hedge using nearby futures to hedge outlying production had gained considerable popularity with aggressive grain marketers because it had been working. Table 1 gives a feel for the magnitude of the benefit by looking at the change (January 1 to July 1) in the July futures contract preceding harvest versus the change (January 1 to July 1) in the December futures contract following harvest for the years 1988 through 1998. The special success in 1994 seemed to especially reinforce and intensify the belief in the rolling hedge approach. I recall special discussions of the risk that July futures could move sharply higher relative to the deferred contracts, with examples from the 1970s cited. These were heard only by some and dismissed by many in these audiences.

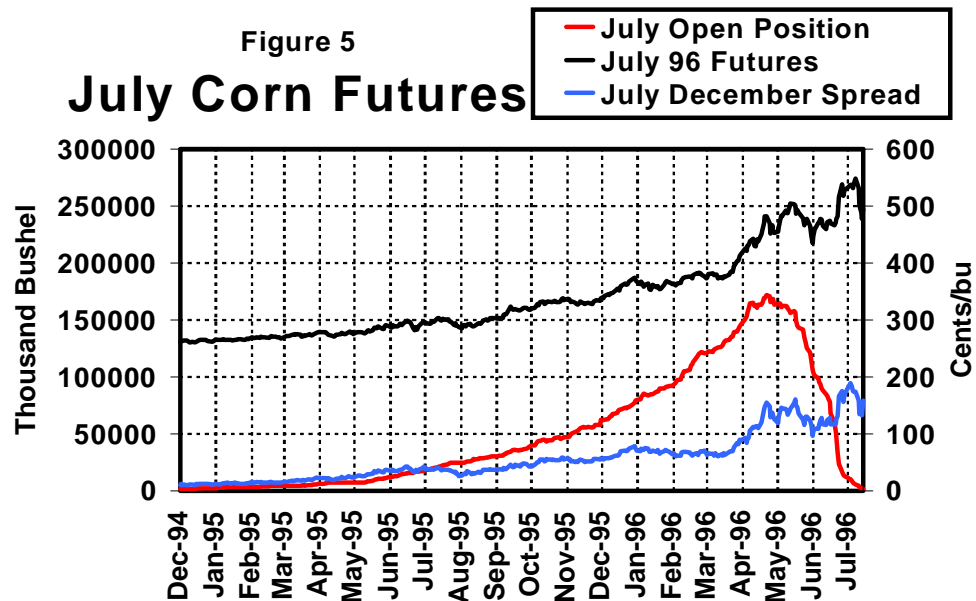
**Table 1**  
**History of Rolling Hedge Advantage**

Year	Change July Futures cents/bu	Change Dec Futures cents/bu	Advantage Rolling Hedge cents/bu
1988	143.75	152.75	9.00
1989	-17.75	-11.75	6.00
1990	48.25	44.75	-3.50
1991	-14.25	-16.75	-2.50
1992	-8.75	5.00	13.75
1993	2.00	7.75	5.75
1994	-61.25	-30.75	30.50
1995	34.75	30.00	-4.75
1996	165.75	73.75	-4.75
1997	-19.25	-25.00	-5.75

The heavy farmer selling in the fall of 1995 involved lots of multiple year hedging and the rolling hedge style was a popular technique. As 1996 proceeded, the ugly reality of what has become known as the Hedged to Arrive problem began to unravel. The July • 96 futures contract, which had been attracting rolling hedge style multiple year hedging in the fall of 1995 with premiums to the December 1996 futures contract in the vicinity of 50 cents per bushel in the October-November period, continued to move sharply higher into 1996 (see Figure 5: July December Spread). Rolling hedges that had been placed in brokerage accounts were experiencing constant calls for more margin. The longer the decision-maker stayed with the position, the worse the situation became. Although these pressures were being experienced in all accounts that held the July futures contract version of the rolling hedge, it was those situations where the pressure on working capital was isolated from the marketing decision making process that became especially ugly. A producer that had a hedge account with a broker and was writing margin checks after check was more inclined to at some point abort the position than a producer that had an essentially identical position in a Hedged to Arrive contract with a local elevator where the elevator was obligated to meet the margin requirements on the producer's behalf. Eventually the margin calls accumulated to the point where creditors to elevators intervened, typically much later versus those trapped in the more traditional customer brokerage relationship.

The fundamental risk associated with the July-based rolling hedge is that it must be rolled. Since initially it was placed against 1996 production, 1995 supplies are not available for delivery against it. The futures contract does not carry the option for crops that will be harvested in October to be delivered in July. At some point, the hedge must be rolled to another futures contract. The exit price for the July futures can be totally disconnected from the value of crops to be harvested in a few months. It became totally a function of decisions by those that held the

other (long) side of the July futures. The price at which they were willing to offset and let trapped out in 1996 was over \$5 for many and as much as \$5.56 for some. Deferred replacement futures were slow to move higher, with July • 96 trading mostly between \$1.00 to \$1.50 (on July 8 at \$1.88) higher than the December • 96 after mid-April 1996 (see Figure 5: July December Spread). The ability for the replacement strategy to carry price level protection forward to the next crop was not there. Once the hedges in excess of the • 95 production were liquidated, the market was quick to retreat from the historically high prices (see Figure 1).



As painful as the exit was for some, it is important to note that a new historic high price was accomplished. In a sense, a new benchmark "glass ceiling" type price now became visible on the price charts. Although one producer by himself cannot affect price, if the behavior of farmers as a group is changed, prices can be influenced. I suspect that the next time corn becomes scarce, whether from a traditional old style drought, or perhaps from the demand side, farmers will be

harder to buy from at the old "glass ceiling" level. Many will have recalibrated their definition of what a good price is; that is, a price whereby they will sell ahead of their normal schedule. In this sense, \$5 plus corn has raised expectations; and I would argue that these raised expectations carry some potential to create the \$5 reality during the next bull market. Corn prices are less likely to stop at the \$3.50 to \$4.00 area when the next bull market in corn tests the question.

### **The Bust**

Over the past 30 years, about two out of three U.S. crops are either good or excellent. In the 1991 to 1995 period the U.S. had only two good crops. In 1991 there had been a drought in the eastern Corn Belt. In 1993 floods in the Midwest had been very damaging to crops. In 1995 a combination of late planting, summer heat, corn borer and localized droughts added up in a big way.

In contrast, the 1996 through 1998 crops have been reasonably good crops (see Figure 2). And, just as series poor crops highlighted by 1995 was the real reason for a short period of very good prices, the recent period of good crops explains most of why prices have declined. Since mid-1996, prices have gradually retreated with quite a bit of oscillation along the way. Now, in the winter of 98/99, ending stocks projections and prices are again about were they were in 1994.

Moreover, since 1994 China has been successful in meeting its growth in demand mostly with its own production (see Figure 3). Also, growth rates in Chinese demand for corn seem to be slowing. Chinese drought in 1997 and floods in 1998 seem to have been adequately buffered by Chinese stocks of corn. China aside, good corn crops in Argentina have played a role in giving the U.S. fresh competition for the world corn trade.



### **Looking Ahead**

Current low prices are likely to persist until something threatens to shrink projected ending stocks to less than 1 billion bushels. This is unlikely to result from new world-level demands as recent disappointment about Chinese demand illustrates. However, it could easily happen if we have another series of poor crops. As usual, weather will be the corn market focus leading up to the summer of 1999. Many current interpretations of the global climate cycles suggest the current La Nina raises the chances that the 1999 crop will have trouble. Current comfortable ending stocks projections would not necessarily be able to buffer the production shortfall that could occur. A major bull market in 1999 is a real possibility that should not be quickly dismissed.