

**The Kinked Demand Curve with a Conjectural Hitch
– A Micro Extension with Macro Implications**

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The Kinked Demand Curve with a Conjectural Hitch -

A Micro Extension with Macro Implications¹

Abstract: Textbooks present the kinked demand curve model as an interesting but largely irrelevant explanation for oligopoly markets with stable prices. This follows Stigler's misrepresentation of Sweezy's article. Yet the original articles suggested that the kinked demand curve might also explain price instability and apparently perverse business decisions.

This paper uses an extension of the kinked demand curve, the "conjectural hitch," which recognizes that a firm may feel that new market conditions require a change in behaviour to protect profits. Firms may raise prices because of falling demand. If a significant number of industries behave this way, stagflation and even job-less recovery will be generated in the economy at large. On the cost side, the conjectural hitch can explain why firms raise prices when fixed costs increase, for instance, when interest rates rise.

1. Introduction

Burbidge (2000) discusses "awkward moments" in public finance - when we teach theories we know are contradicted by empirical research. One of his examples is the prediction that firms will not, indeed cannot, in the short run, pass on an increase in profit taxes. This example is equally awkward for micro economists. There are many embarrassing examples in micro economics. Our students' casual empiricism - reading the daily newspaper - uncovers a myriad of cases which contradict our profit-maximising theories (competitive or other). How do we explain firms which raise prices when demand is falling? In the recession of the early '90s, industries as diverse as advertising and newsprint explained rising prices, in the face of falling demand, as "necessary" to maintain profits or mark-ups. Other firms claim price rises are forced on them because of the loss of economies of scale when sales slump.

Some firms claim high or increased fixed costs force them to raise prices; for instance, pharmaceutical companies cite the high cost of R&D for their pricing

¹ Credit, without culpability, goes to Hassan Bougrine, Peter Burton, John Cornwall, and Nicholas Rowe for their useful comments.

practices. Canadian chartered banks raised domestic service charges “because of their losses on foreign loans,” Coca-Cola raised prices to offset the losses from their European recall, and tobacco firms predicted price increases because of the billions in fines levied against them. Where in micro economics does a rise in fixed costs lead to immediate price increases if no firms leave the industry?

It is not sufficient to argue that these explanations are simply fig leaves covering corporate intentions. Of course companies present whatever rationale they think will smooth the ruffled feathers of consumers – as they pluck them. However rationalized, corporate behaviour often contradicts our models.

If these examples are awkward, economists should feel intense chagrin with respect to the kinked demand curve (KDC) model, but not because the evidence contradicts the model. It is precisely because the daily evidence is consistent with the model and its extensions that we should examine our motives for treating the kinked demand curve with, at best, benign neglect.

This paper argues that an extended KDC explains the examples cited above and provides insight into both stagflation and job-less recovery.

2. The Kinked Demand Curve

2.1 The Treatment of the Theory of Kinked Demand

The textbook² presentation of the Kinked Demand Curve (KDC) (Kaushik and Casey 1982) is actually Stigler's 1947 mis-representation of the theory as developed by Sweezy (1939). The KDC model is usually cited as an attempt to explain price stability under conditions of changing marginal costs. Sweezy actually argues that increased wages need not raise prices and therefore can have a re-distributive rather than an inflationary impact. He notes - only at the end of the article - that "this analysis can be

developed in such a way as to throw light on the much debated problem of rigid prices, but to do so would be beyond the scope of this paper" (1939, 572). Price rigidity was clearly not the focus of the original articles.

On the contrary, both Sweezy and Hall and Hitch (1939) emphasize that the kinked demand curve can lead to price variations or the possibility of more than one equilibrium (Sweezy 1939, 573). Hall and Hitch are unequivocal. "We may distinguish two main cases, which we shall call those of price stability and instability, since the terms equilibrium and disequilibrium have a connotation too precise to be warranted here" (1939, 27).

Thus Stigler's "test" of the KDC was inappropriate, a "narrow empirical hypothesis concerning price rigidity" (Freedman 1995, 176). Nonetheless, Stigler's views colour the discipline's perception of the model. This is still more disconcerting given the KDC literature, which is primarily favourable. Deploring the longevity of the KDC theory, Stigler notes that "Of the 189 references to the kink, 143 were favorable, 29 neutral, and 17 unfavorable" (1978, 196). Given the ability of the kinked demand curve to explain the real world, its neglect should be the source of considerable embarrassment to economists.

2.2 The Conjectural Hitch

For our purposes, the most useful elaboration of the KDC literature is the recognition that a firm's conjecture about the reaction of competitors can change with new conditions. This leads to the sliding kink of Cyert and DeGroot (1971) or to the "conscious parallelism" of Hamburger (1967). When firms believe that everyone would like to see prices rise, the kink is shifted by a change in firms' conjectures of their competitors' reaction to a price change. As this is implicit in Hall and Hitch (1939, 28, fn

² A notable exception is Douglas (1983).

2), it seems appropriate to call it the “conjectural hitch.”

To develop the conjectural hitch, begin with a conventional kinked demand curve, CKG in Figure 1. CK is a segment of the *ceteris paribus* demand curve - it shows what one firm’s demand would be if it set a price above the current equilibrium price, P, and, among the other things (*ceteris*) held constant (*paribus*) are its competitor’s prices. Raising price above P means the firm not only has customers who reduce their quantity demanded, but others shift their purchases to competitors whose prices have not risen.

On the other hand, KG is a segment of the firm’s *mutatis mutandis* demand curve FKG, the firm’s demand if it changes its price and its competitors react by also changing theirs to keep their prices in line with the firm which initially changes prices. The firm’s demand curve is kinked at K because it conjectures that if it raises price, competitors will hold theirs constant but if the firm lowers its price, competitors will reduce theirs too. Thus, the demand curve is made up of two segments, CK and KG, which reflect the asymmetry of the firm’s conjecture about how competitors react to its raising or lowering its price.

When the demand curve for the oligopolistic firm is CKG, the relevant marginal revenue from the demand segments CK and KG are the segments CA and BE, respectively. We assume for simplicity a constant marginal cost, MC. The product sells at price P with q_1 units sold by the firm represented. P represents the best the firm can do to maximise profits, given the marginal cost curve is in the gap between the discontinuous marginal revenue segments.

If demand for the product falls, e.g., a recession occurs, assume that the quantity demanded falls by half at each price. The original marginal revenue segments form parts of the new demand curve CK’B in Figure 2. The relevant marginal revenue segments are

now CA' and B'E'. Given that the marginal cost curve still lies in the gap between the marginal revenue segments, the traditional kinked demand curve explanation would be that price remains stable, at P, despite the significant fall in demand, with output for this firm now at $q_0 = q_1/2$. Other firms in the industry would be similarly affected, so that industry output falls by half, with concomitant declines in employment.

2.2.1 Stagflation

If there is a recession, the fall in demand in Figure 2 is general to the industry, not specific to the firm represented. All firms in the industry suffer from falling profits and wish to see an improvement. A price cut will be matched by competitors who do not want to lose any more sales. Desperate times call for desperate measures. If a price cut will make things worse, what about the reverse strategy? The firm may feel its competitors would be willing to try anything, even a price hike, to recover some profits. However, the firm may not know how much their competitors are willing to increase price.

The highest hitch in price, i.e., the increase which maximises profits, is determined by the intersection of the marginal cost with the recessionary *mutatis mutandis* marginal revenue curve, E'B', extended to B'' in Figure 3. If each firm knows the other firms recognize this, the first firm to act on the change in conjecture and to raise price will move immediately to the new profit maximising price, P'', with the recessionary kink shifted to K'' as the relevant segment of the *mutatis mutandis* demand curve is extended, becoming K''K'B to reflect the hitch in price from the conjectural change. As competitors will not follow a price increase above P'', the *ceteris paribus* portion of the demand curve becomes C'K'' after the conjectural hitch. The rise in price drives quantity demanded still lower, from q_0 to q'' .

Thus, the conjectural hitch extending the *mutatis mutandis* demand curve

makes the recession worse than it would be otherwise, but there is some recovery in profit levels. The increase in profits is the area in the triangle formed by the marginal cost curve and the B'B' segment of the marginal revenue curve – output has been reduced where the marginal cost exceeded the marginal revenue.

To the extent that this KDC oligopolistic industry is representative of, or important in, the entire economy, the strategy of “protecting profits” in a downturn generates stagflation, i.e., rising prices and increased unemployment as demand falls due to the recession and as quantity demanded falls because of the higher price in the kinked demand curve oligopolies. The effect spreads to industries whose firms do not face kinked demand curves but which purchase the outputs of the KDC industries. The marginal costs of these purchasers rise, reducing the price cuts these purchasers would make because of the recessionary fall in the demand for their outputs.

2.2.2 Job-less Recovery

What happens when the economy “recovers” and demand returns to its original level? With expanding sales, it is unlikely that firms will return price to its initial level, P .³ The price P'' , established in the recession, is still the profit-maximising price after the “recovery” from the recession when demand would return to the previous peak demand - if price were returned to the initial price, P . But if each firm in the oligopoly recognizes that P'' is the profit maximising price, the original *mutatis mutandis* demand curve is extended to K_n , with the marginal revenue segment B_nBE , in Figure 4. A new *ceteris paribus* demand curve, $C'K_n$, would be in effect, should the firm consider raising the price above P'' .

³ If firms lowered prices with the restoration of demand, the result would be closer to Rotemberg and Saloner (1986). Theirs is a much more complex theory, requiring collusion with threat and costly punishment for firms which break ranks. It too predicts prices move in a counter-cyclical fashion, but with stable prices in recession and falling prices in expansions. Contrary to the conjectural hitch, their model implies a deflationary bias in the economy.

Because of the hitch in price during the recession, output in the recovery phase is $q_n < q_1$, even though quantity demanded has returned to its original level in Figure 1 at the old price level, P . The new level of output - and employment - is below the initial level for each firm and for its industry. But output and employment are not restored for the aggregate economy either, if enough firms are selling in kinked demand curve markets or are buying inputs from such markets and therefore their costs rose during the recession but did not fall in the recovery.

Thus, maintaining the price established by the change in conjecture during the recession means that output for that industry at the next peak of the business cycle will be lower than in the prior peak.⁴ This also means fewer jobs when the economy reaches the new, but diminished, peak. Hence, by invoking the conjectural hitch we generate both inflation during recession and reduced production in the recovery, i.e., stagflation and job-less recovery over the life of the business cycle.

2.2.3 Multiple Cycles

Use of the kinked demand curve with the conjectural hitch introduces both micro and macro asymmetries. The kink itself is based on the assumption of an asymmetry in the reaction of competitors to price increases compared to price decreases. The conjectural hitch implies asymmetries in this behaviour over the business cycle. Moreover, there may be asymmetries between business cycles over time.

In section 2.2.1, we assume that the firms in the recession would move immediately to the profit-maximising higher price, P'' - the full conjectural hitch. Cyert and

⁴ Here we are straying from the original suggestions of Sweezy and of Hall and Hitch. Both articles suggest that the kink could reverse itself at the top of the cycle - when firms are working at capacity, they may be willing to follow an increase in price but not a cut. There is little empirical support for this "reflex" kink. Efrogmson (1943 107) states it is "obvious that reflex and obtuse demand curves are intimately linked to cyclical fluctuations, both in their origins and in their effects." However, he subsequently lost his enthusiasm for the reflex demand curve (Efrogmson 1955).

DeGroot (1971 284) argue that the firm will raise prices gradually until it finds where the new kink is, i.e., the price after which other firms will not follow further increases. In this case, we could observe more than one recession during which firms gradually raise prices and stagflation might appear chronic. However, once prices have risen to P'' , profit-maximising firms should no longer react to a recession by raising prices.

As P'' is the price at which $MC = MR$ with a kinked demand curve, it becomes the firm's profit-maximising price in the recession. Once P'' has been achieved, perhaps in tentative steps over two or three recessions, there is no incentive for further price increases in the next recession. Therefore, we would observe business cycles with stagflation followed by job-less recovery but should eventually see a cycle which moves between the limit output levels q'' and q_n , with stable prices, *ceteris paribus*.

Of course, *ceteris* are never *paribus* and we can develop different scenarios over a series of business cycles. The industries engaging in "conjectural hitch" price increases may be sufficiently large to cause stagflation through their own price increases and their impact on downstream industries which are not themselves subject to a kinked demand curve. As noted, these marginal cost increases dampen recessionary price cuts in these downstream industries. These price increases will also increase the costs of inputs for kinked demand curve oligopolies and of wages, as workers try to maintain their purchasing power. This will cause the marginal cost curve in our diagrams to shift up, away from the intersection with the *mutatis mutandis* marginal revenue curve.

The upward shift of the marginal cost curve creates still more potential scenarios. Clearly once the marginal cost has shifted above the marginal revenue curve, the opportunity for stagflation is renewed. It also raises the possibility of other non-conventional inflationary pressures.

For instance, assume the economy is moving back to the peak of the cycle and the central bank decides that it must raise interest rates to avert inflation. As with

Burbidge's tax increase, a rise in debt servicing costs increases fixed costs – which, in conventional models of marginal-cost pricing, is not predicted to be passed on in the short run. However, with all firms in the kinked demand curve industry facing this increased fixed cost and a reduction in their profits, there may well be a conjectural hitch. Firms decide that profits can be improved by raising prices. If the marginal cost is above the *mutatis mutandis* marginal revenue segment, although still in the gap between the marginal revenue segments, there is room for a hitch in prices, i.e., an extension of the *mutatis mutandis* demand curve yet again. Again, the limit in the price increase is the intersection of the extended marginal revenue curve with the marginal cost curve.

Thus, monetary policy could generate self-fulfilling prophecy. The Bank fears inflation and introduces higher interest rates. These higher interest rates increase firms' fixed costs which lower profits. Industries where firms face a kinked demand curve have improved their profits in the past by raising prices. Each firm's conjectural variation changes, anticipating that its competitors would also like to see prices rise to offset the increased fixed costs. A conjectural hitch occurs and prices rise. What the Bank fears actually happens when the Bank implements a tight-money policy to allay its fears. This happens because of the Bank's neoclassical analysis, not because of complications in monetary policy (Bhattacharya and Kudoh 2002; Neiss 2001).

2.2.4 A Reverse Hitch?

The discussion so far has applied the conjectural hitch to argue that, in a recession, a price rise will improve profits (i.e., reduce the fall in profits caused by falling demand) because the extension of the *mutatis mutandis* demand curve enhances profits as long as the marginal cost lies above the relevant segment of the marginal revenue curve. But an extension of the *ceteris paribus* demand curve to lower prices would also increase

profits - in this case because the marginal revenue curve for the *ceteris paribus* demand curve is above the marginal cost. If the firm could lower price while others held theirs constant, the increased sales would increase profits.

As noted above, the competing firms are not likely to keep their prices constant when one firm lowers theirs - there is little reason to think that the *ceteris paribus* demand curve and its marginal revenue curve could be extended. Sweezy (1939 570) suggests it is possible, if the firm can make secret price concessions to its customers. However, it is likely that competitors will recognize the reason for their loss in sales and also cut their prices, re-instating the K'B' *mutatis mutandis* demand curve.⁵ This appears to have happened in the past with the North American newsprint industry, where some firms made "off-list price concessions" (Booth et al. 1991, 257). Having learned that the *ceteris paribus* demand curve could not be extended, the solution appears to be to engage in the conjectural hitch, raising newsprint prices and signalling the increase through the media.

2.2.5 Inflationary Bias

This discussion provides an explanation for stagflation, but also for an inflationary bias in the economy. Faced with a recession, some industries will resist a fall in price and others may actually increase prices. The latter industries' price decisions will dampen the deflationary effects of yet other industries which respond to a fall in demand by a drop in prices. But, faced with rising input costs during the recession, these industries will increase prices when the economy moves out of the recession. The kinked demand curve industries are likely, at best, to maintain the higher prices established in the recession.

⁵ Many firms advertise they will not be under-sold, signally to consumers and to competitors that they will match other firms' price cuts, i.e., confirming that this is a kinked demand market.

Thus prices which are sticky downward need not be the fault of unionized workers unwilling to accept wage cuts or of “social norms” (Fortin 1999, 1085). Sticky prices may be the result of imperfectly competitive markets in which the kinked demand curve dominates and the conjectural hitch is possible.

3. Summary and Conclusions

3.1 Explanatory Power

The kinked demand curve model, extended by the conjectural hitch, has considerable explanatory power. The model still allows us to explain periods of price stability while marginal costs are rising. The conjectural hitch provides explanations of business behaviours which do not require us to assume “ignorance or perversity” (Sweezy 1939, 569) on the part of corporate decision-makers. Nor do we need to assume that firms are not always profit maximisers (Reder 1947).

Thus, we can explain why, firms may raise prices as soon as they are faced with an increase in their fixed costs or when demand falls. We can also explain why there are times of price stability in industries, but seldom periods of price declines. The theory also explains why the Phillips curve is not stable. These are not minor accomplishments at either the micro or the macro level.

3.2 Predictive Power

While the kinked demand curve model with the conjectural hitch increases our explanatory capacity, does it add to our predictive capacity, given the number of conditions that must be met? Rothschild notes (1992:69) that as firms “hold their asymmetric conjecture at any given price, the location of the 'kink' is indeterminate and hence unpredictable.” Ng (1986:120) states that in the long run, “average price will change by whatever amount it is expected to change.” But this should not be a surprise.

Skinner (1981 133) cites Schackle's caveat: "When economic theory elects to bring in imperfect competition and to recognize uncertainty, there is an end to the meaning of general equilibrium. Economics thereafter is the description, piece by piece, of a collection of fragments."

However, "description" does not give due credit to the conjectural hitch model. Newspapers regularly describe firm strategies which contradict theories built on conventional demand curves. The kinked demand model with the conjectural hitch allows an explanation of those strategies.

Prediction is not ruled out by relying on changes in conjecture. "For it remains possible to distinguish policy regimes or institutional arrangements that allow sunspot [self-fulfilling changes in expectations] equilibria from those that do not" (Woodford 1991; 79). If we have enough information on marginal costs and revenues, and on industrial organisation, the conjectural hitch allows us to make predictions, however tentative; predictions about what is likely to happen in particular industries because of the conditions they face. And if there is a clustering of industries facing common conditions, there may even be macro regularities which would allow predictions at the macro level, for instance of periods of stagflation followed by recessions in which prices are merely sticky downward.

Therefore, to move from explanations to predictions requires that we seek the relevant micro and macro data to apply the model. This requires giving it enough credibility to recognize the benefits of applying and testing it. Sceptics who have done so, such as Cyert and DeGroot (1971) have become believers.

In the meantime, we should prefer a theory which allows explanation and some indication of future directions when the alternative is theories which predict with authority, pointing the wrong way.

3.3 Implications

3.3.1 Policy

A variety of policy issues proceed from this discussion. We can return to Sweezy's original concern with changes in wages, although the modern context reverses the issue. The stability of prices can be invoked to counter those who argue for wage cuts to increase our global competitiveness. In a kinked demand industry, significant wage cuts need not lower prices and would only shift income from labour to capital. This fits the stylized facts of the last quarter century in North America.

Nor can governments rely on globalized markets to enforce price discipline if those markets are made up of oligopolies which have a variety of ways - e.g., patents, spatial monopolies, product monopolies, control of raw materials - to avoid competition. Where some competition exists, firms may face kinked demand curves. The implications of global stagflation would appear to be more significant than national stagflation, if only because of the potential for increased synchronicity in national business cycles. If globalization internationalizes the conjectural hitch, more nations will suffer from more severe recessions by the conjectural hitch and thus pull each other still further down.

The conjectural hitch also reduces the capacity of interest rate policy to control inflation. Indeed, the effects of high interest on price may be perverse. Where a conjectural hitch is possible (i.e., profit maximising because marginal cost is above the marginal revenue for the *mutatis mutandis* demand segment), an increase in interest rates may trigger a conjectural hitch, driving up prices in a market which might otherwise have stable prices. Will the central bank be able to recognize the occasions when interest rate increases will be counterproductive?

The conjectural hitch model does indicate the limits to the stagflation

phenomenon, that cycles of stagflation and job-less recovery need not be cumulative beyond the limit imposed by profit-maximising behaviour. This ceiling is porous to the extent that the inflationary tendencies of the conjectural hitch feed back to the industries initiating the stagflation. However, in Canada this feed-back effect is likely to be dampened, for instance, by our high level of exports. Thus, the fear of some central bankers that a little inflation will ultimately lead to hyper-inflation is not well-founded in this model. The argument for zero-inflation targets by the monetary authorities is therefore not supported.

3.3.2 The Profession

As economists, the conjectural hitch should reduce the number of embarrassing moments as it allows us to explain the business pages to our students. Nonetheless, our chagrin should remain that such a rich theory was so easily diverted by Stigler's 1947 attack and that the subsequent elaborations of the kinked demand curve theory have been generally neglected.

Beyond teaching and ability to explain, if our research agenda reflects greater interest in the KDC model, particularly with the conjectural hitch, we can amass sufficient information to understand the state of specific industries. We could then predict, with some reliability, when a conjectural hitch is possible, even likely. We might also be able to link micro conditions to the macro economy and be in better position to predict which policies would be effective at which times.

The KDC model's asymmetries and uncertainties are often critiqued as its major weakness. The conjectural hitch adds to those asymmetries and uncertainties. However, as Scitovsky (1978 227) notes "Asymmetry...is very characteristic of economics. Yet, economic theory takes scant notice of it, owing perhaps to our predilection for

mathematical elegance..." The economy is not an elegant set of systems, so we should see it as a strength when a theory reflects observed asymmetries and uncertainties.

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Figure 1 Kinked Demand Curve

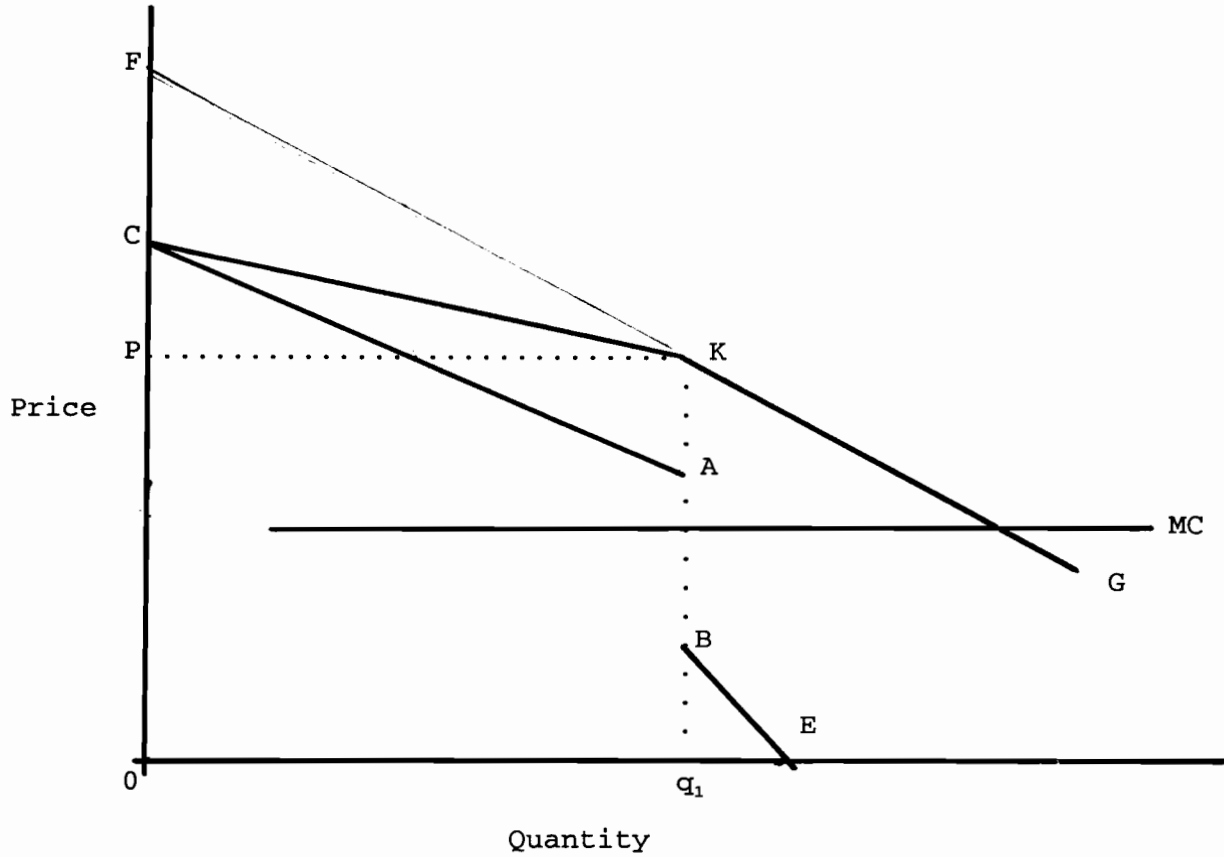


Figure 2 Kinked Demand Curve with
Falling Demand

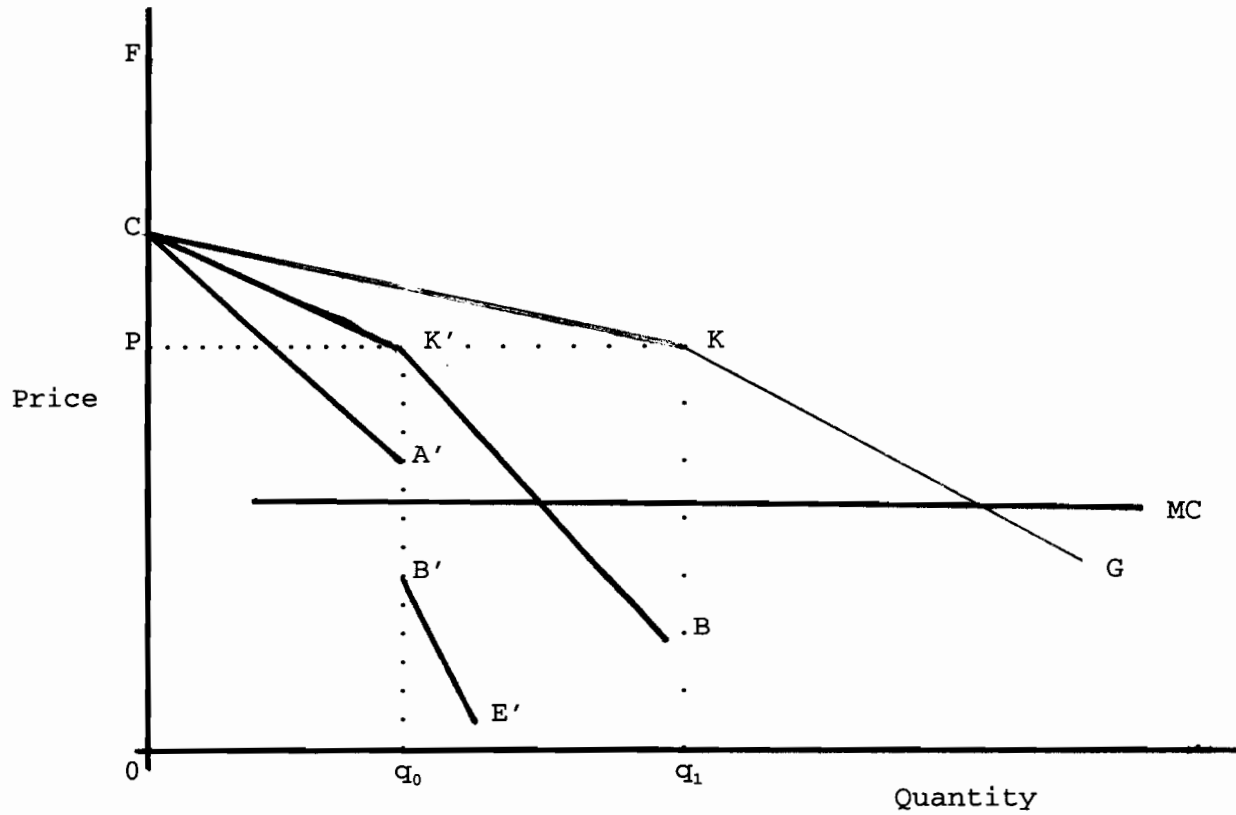


Figure 3 Falling Demand with a Conjectural Hitch

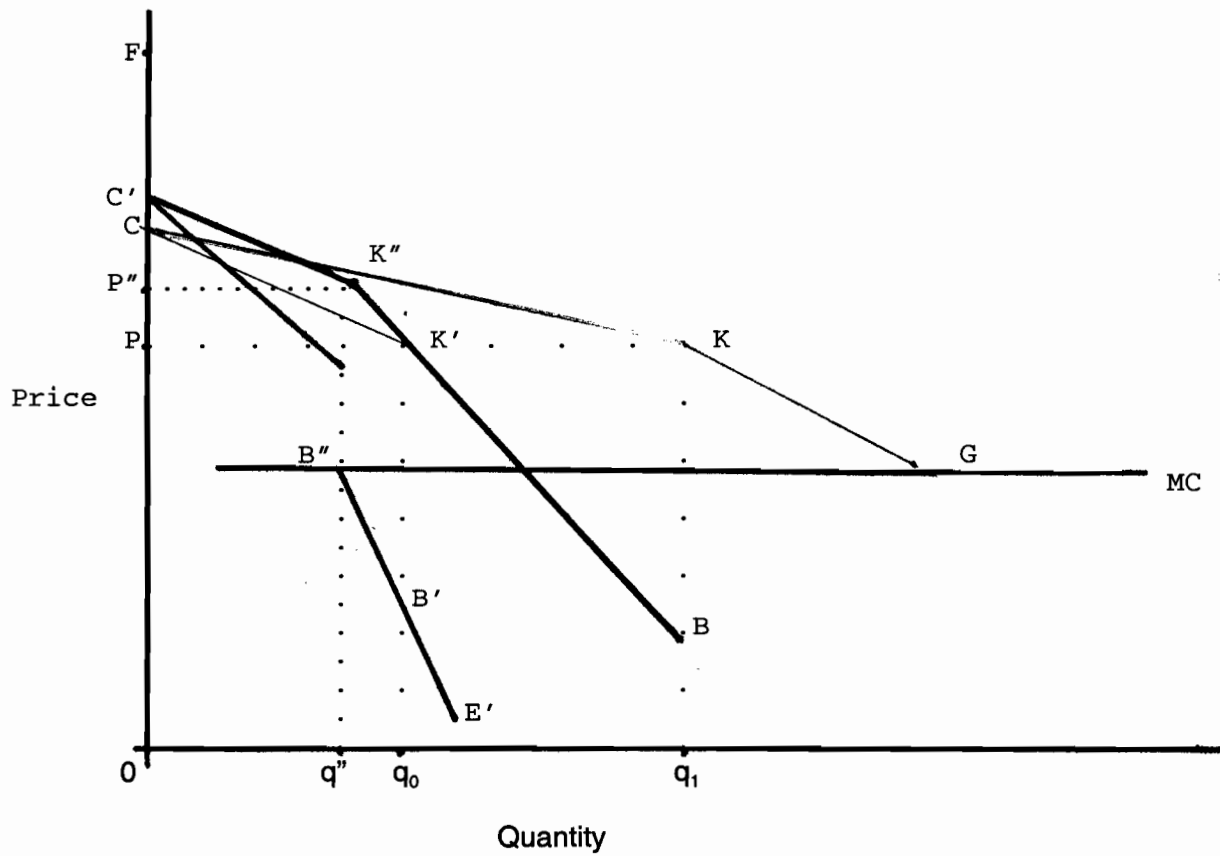


Figure 4 Return to Initial Demand, After a Conjectural Hitch

