

I ntroduction



Changing times

For reasons perhaps only psychiatrists can understand, passions run deep about garbage. Professionals may call it solid waste, but customers still call it garbage. And, as many public works managers will attest, messing with people’s garbage routines can invite trouble.

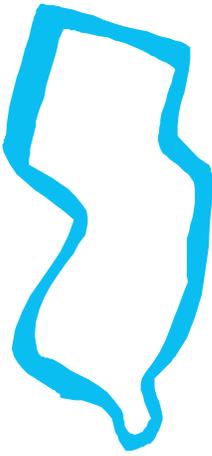
Passions run equally high about recycling. Since passage of mandatory recycling in New Jersey, an entire generation has grown up with recycling as a way of life – as a moral and legal responsibility of all citizens. It has enjoyed high popularity as the right and smart thing to do.

An increasing number of voices, however, have questioned both the practice of recycling and the premise upon which it was created. The criticisms initially came from free-market advocates, including the Reason Foundation and the Cato Institute. They argued that recycling had needlessly increased the cost of solid waste management in return for little environmental benefit. When the *New York Times Magazine* came to the same conclusion in its cover article “Recycling is Garbage,” this critique of recycling had migrated from the free-market libertarians to the mainstream media.

Recycling highs and lows

Amidst this nationwide questioning of recycling, the economic and regulatory foundation of our statewide solid waste management system was crumbling. From 1994 to 1997, a series of court decisions challenged core sections of New





Jersey's system of flow control. This regulatory system had dictated the destination and disposal price of all solid waste generated within New Jersey's borders.

Flow control is a powerful financial tool. For solid waste managers, it guarantees a reliable supply of waste at a price that can't be undercut by competition. With a guaranteed stream of waste and money, counties could confidently invest in their chosen tools of solid waste management, including incinerators, landfills, transfer stations, recycling processing centers and recycling education and collection programs.

Flow control helped make the financial case for recycling. Flow control, and the environmental program investments initiated during the flow control era, resulted in some of the highest garbage disposal rates in the country. Those solid waste system rates, which averaged \$92 per ton statewide and topped \$125 per ton in some counties, provided powerful economic incentives to recycle. The system essentially gave recycling a hefty head start in any cost competition with solid waste disposal. And when prices paid for recyclable commodities hit astronomic highs in 1994-95, the net costs of recycling never looked better.

The 1994-95 price peaks, however, were just that – peaks. And prices were already heading south when the *New York Times Magazine* article hit the newsstands in June 1996. After the U.S. Supreme Court chose not to hear a final appeal from New Jersey regarding regulatory flow control, garbage disposal prices began to plummet. Within months, rates in some counties had fallen almost 50%. Even though the reduced rates in some cases did not fully capture all operating and debt costs of the disposal facilities, the financial effect on recycling was immediate.

At once, two main economic benefits of recycling – sale of materials and avoided cost of garbage disposal – had plunged drastically.

The more things change...

So where does this leave the economics of recycling in New Jersey? Ironically – exactly where it has remained all along. Mandatory recycling remains the law throughout the state. New Jersey's solid waste policy does not require recycling to be more cost-effective than garbage disposal. In fact, state policy is built on and sustained by the premise that recycling provides environmental and economic benefits, from job creation to resource conservation, that may not be reflected in a simple accounting of today's costs and revenues.

Promoting recycling in New Jersey is an environmental policy; it is not a license to run inefficient recycling programs. Given the state mandate, the goal of all recycling coordinators has always been to design programs that minimize costs and maximize returns. The methods of analysis and decision-making have never changed – only the numbers we plug into the equations have. And New Jersey still has some of the most promising recycling cost-benefit numbers in the country. We may have to look harder for savings, but the opportunities are there.

Mandatory recycling remains the law, and New Jersey still has some of the most promising cost-benefit numbers in the country.



How to Enjoy This Manual

Start Anywhere...

Read It Any Way You Want

The content is structured to flow from big-picture issues to small ones, but feel free to go against the flow. You should be able to read any chapter and any section of any chapter without reading other parts. Sometimes the manual will refer you to other sections for more detail, but go there only if you want.

Chapter 1

What You Can Skip Without Financial Penalty

You can skip all of Chapter 1 and still run the world's most cost-effective recycling program. Chapter 1 discusses the laws of supply and demand and their peculiar relationship to recycling in New Jersey. It can help you better analyze how economic news and government policies may affect your program, but many of these forces are beyond your control.

Chapter 2



How costs act

If You Just Want to Know How Much Recycling Costs

The “Weird World of Costs” in Chapter 2 introduces some bizarre cost behaviors, and “Cost Benchmarks” helps measure a program’s success. To calculate cost of service, read “Full Cost Accounting” and use that section’s worksheet.

Chapters 2 & 3



How to cut costs

For the Ruthless, or the Tentative, Cost Cutter

To get right down to business, read the “Cost Benchmarks” section in Chapter 2 and gather the “Route Audit” data at the end of the chapter. Chapter 3 on cost-benefit analysis will help you decide whether a given project is cost-effective. To make that call for an overall program, compare total solid waste management costs with and without recycling. Chapter 2 and Chapter 3 are most helpful with that.

Chapters 4 & 5



Buying and selling tips

If You Work with Contractors or Like to Sell Your Stuff

Chapter 5 is nothing but contracts. Elect not to read it at your cost peril. It contains the manual’s highest proportion of legal words, but hey, that’s life with contracts! It includes specific language to save you money and headaches. The markets chapter and the contracts chapter have some specific language and strategies you may want to consider.

1

Understanding Recycling Economics

Fundamentals of supply and demand

Predicting the unpredictable

Economics: What's the use?

It's hard to stand on a shaky price floor

Shifting the demand curve out

Increasing demand for recycled products

Economics in action: Mandatory recycling

Pushing supply and pulling demand

Fundamentals of supply and demand

Recycling markets are controlled by the same laws of supply and demand that control markets for everything from breakfast cereals to beauty products. That's good news and bad news. The good news is that you can expect markets to behave rationally in the long run. The bad news is that "in the long run, we all are dead," as the famous economist John Maynard Keynes noted. In the meantime, we all live and work in the short run where markets seem anything but rational. Fluctuations in supply and demand can cause prices to soar one day and plummet the next. And no one – no broker, no market analyst, no trade publication – can accurately predict where prices are going or when they will get there. No matter how confident "experts" may sound, they cannot accurately predict price movements in a free market.

Predicting the unpredictable

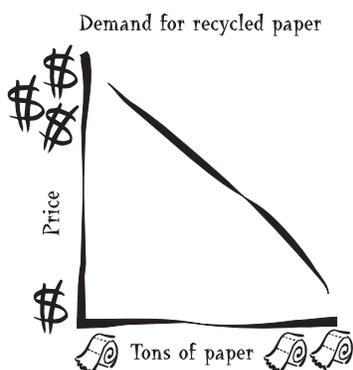
In free markets, prices are determined by a combination of the individual decisions of thousands, hundreds of thousands or millions of buyers. In competitive markets, these buyers don't coordinate their decisions with each other. They make decisions based on their own needs and budgets. To predict

prices, you need to know how each buyer will behave before he or she buys. And even that won't do it – you also need to know how each seller will behave at the same time. Anyone who can reliably predict market prices would never have to work. Life would be a perpetual and lucrative vacation while he or she buys low and sells high from a yacht in the Cayman Islands.

That leaves the working world to live with the unpredictable laws of supply and demand. Even if recycling coordinators cannot predict movements in markets, they still can understand them. And they are really simple to understand. The laws of supply and demand boil down to some simple lines that confirm what most buyers and sellers know instinctively.

1. Buyers like to buy more when prices are low and buy less when prices are high.

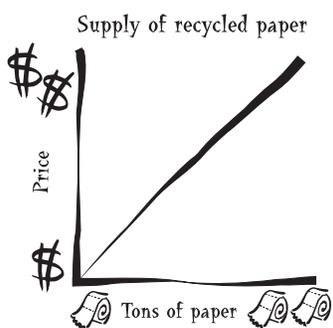
When the independent decisions of all buyers are added together, they might look like the graph *Demand for recycled paper*. **For any price on the graph, there is a corresponding quantity that represents the total demand of buyers at that price.**



this is a demand curve for recycled paper

2. Sellers like to sell more when prices are high and sell less when prices are low.

When the independent decisions of all sellers are added together, they might look like the graph *Supply of recycled paper*. **For any price on the graph, there is a corresponding quantity that represents the total supply offered by all sellers at that price.**

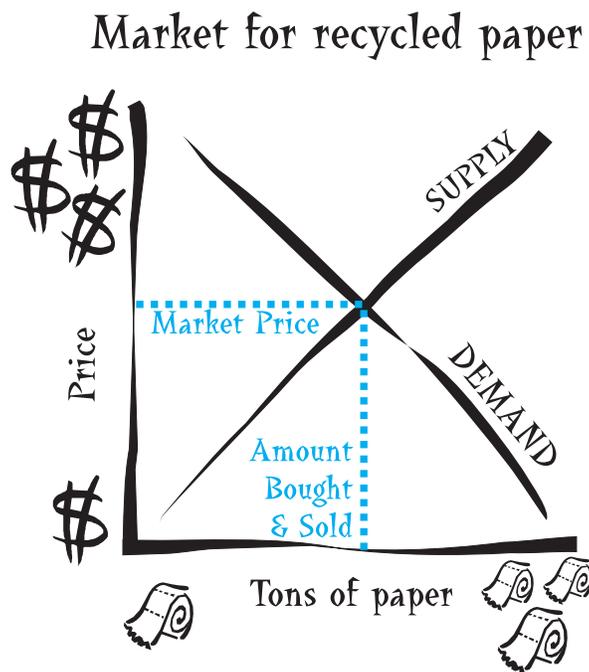


this is a supply curve for recycled paper



3. The price of any good and the total quantity sold will be set where the supply and demand are equal.

This statement corresponds to the graph *Market for recycled paper*. Notice that the lines intersect at only one point. At that price, the total amount supplied by sellers equals the total amount demanded by buyers. At a higher price, total supply exceeds total demand, creating a surplus. To move their products, suppliers will tend to drop prices until demand equals supply. At a lower price, total demand exceeds total supply, creating a shortage. **With more orders than they can fill, suppliers will tend to raise prices until demand equals supply.**



That's the heart of supply and demand. Understanding this basic relationship can help coordinators understand how and why recycling policies and economic trends can affect their programs.

Economics: What's the use?

Economists have a bad habit of oversimplifying the real world with convenient assumptions. For supply and demand to work in its purest form, economists “assume” several conditions are met in “perfect competition.” Some of their assumptions may not apply neatly to recycling markets.

1. The market consists of many sellers and many buyers, and none is big enough by itself to affect prices in the market.

In many recyclable markets this assumption often is not true. For example, when one large paper mill closes, it often does affect prices throughout regional markets. Markets may exist in other cities or regions, but the added cost of transporting materials to those markets may effectively close them to local suppliers.

2. Each seller provides a product that is indistinguishable from all others like it.

For recycling markets, this condition is often met to a large degree. That is, an identical amount of clean, baled corrugated cardboard from one source is usually not preferred over the same quantity of clean, baled corrugated cardboard from another source. Markets can, and often do, penalize sellers who cannot meet contamination standards or who cannot supply minimum quantities. In both cases, however, those sellers are providing a less valuable commodity, so it is not indistinguishable from all others.

3. Buyers and sellers can easily enter or exit the marketplace.

Mandatory recycling establishes a legal requirement to remain as a seller in the market, almost regardless of price. This is discussed in *Economics in action: Mandatory recycling* later in this chapter.

If mastering the laws of supply and demand won't help you predict prices, and if perfect competition depends on assumptions that often ignore the reality of recycling markets, exactly what are these pillars of economics good for? Plenty. They can help guide statewide and nationwide recycling policies, and they are powerful tools to analyze everything from market upheavals to government regulations. Understanding those forces can help you make more educated guesses about future directions of markets, even if you can't predict exact price movements. Price floors and mandatory recycling laws provide useful examples.



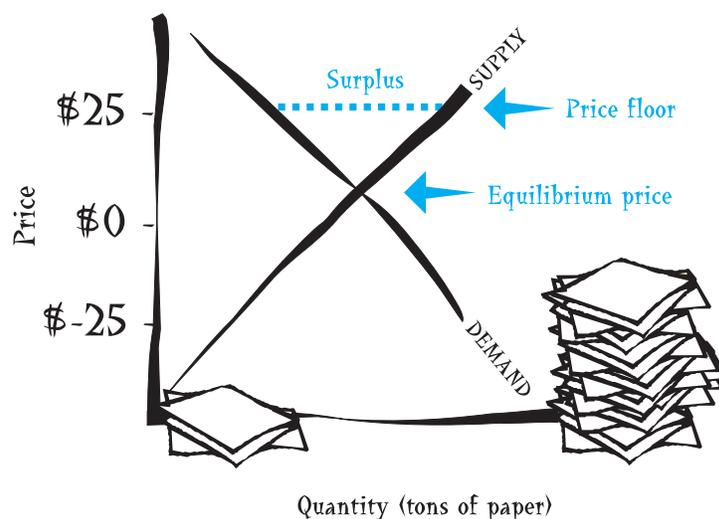


It's hard to stand on a shaky price floor

Low prices for recycled materials have been a long-term problem for recycling coordinators. If prices were higher, the incentive to recycle would be higher, and tonnage would rise. Good idea – so why can't governments simply set a minimum price, also called a "price floor," for recyclables?

For example, with garbage disposal costs near \$50 per ton, the economics of recycling office paper in New Jersey looks more promising if organizations can receive at least \$25 per ton for the paper they generate. What happens if the federal government declares a \$25 minimum price when the paper market has been paying \$5 per ton on average? The following graph illustrates an example of what supply and demand would predict.

A \$25 price floor for recycled office paper



Price floors

As illustrated by the graph *A \$25 price floor for recycled office paper*, at \$25 per ton, suppliers want to recycle more paper than buyers are willing to purchase at that price. The result is a surplus. Normally, the price would fall to \$5 per ton, where the total amount supplied by all sellers would equal the total demand by all buyers. But in this case, the price floor prevents a drop in price. This is exactly what happened with many agricultural commodities after the federal government set minimum prices above the open market equilibrium. This policy created huge surpluses of farm commodities, and the federal government had to buy, store and distribute the surplus at a cost that ultimately reached several hundred billion dollars before the price supports began to be phased out in 1996.

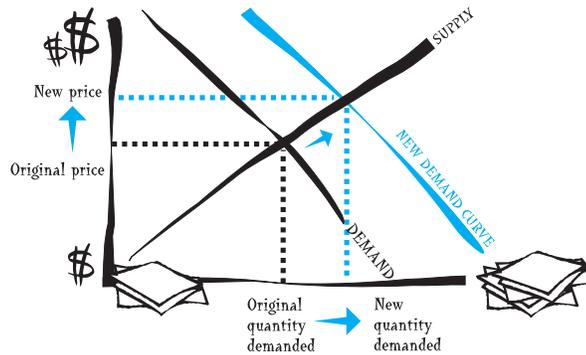
Shifting the demand curve out

If governments cannot simply decree higher prices without creating unwanted side effects, what can policy makers do to help increase prices for recyclables? The laws of supply and demand provide three basic options – increase the demand for recyclables, decrease the supply of recyclables, or both.

An increase in demand

As illustrated by the graph *An increase in the demand for recyclables*, increasing the demand does not mean lowering the price. It means that at any given price, buyers are willing and able to purchase more of a good. An increase in demand causes the original demand curve to shift to the right (because at every price on the demand curve, more goods are being demanded). The result is a recycling coordinator's dream – more tons of materials recycled and higher prices paid per ton.

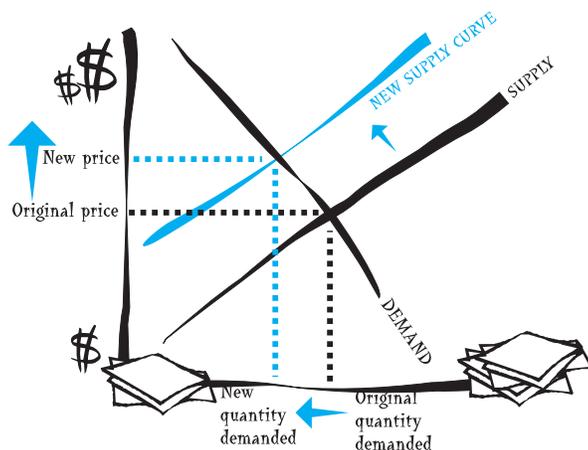
An increase in the demand for recyclables



A decrease in supply

As is demonstrated in the graph *A decrease in the supply of recyclables*, decreasing the supply means that at any given price, suppliers are willing to sell less than before. Remember, if you collect recyclables, you are a seller in these markets (even if you must pay to “sell” your materials). Ironically, this is the situation predicted by a drop in landfill and incinerator disposal prices. In this case, organizations that are collecting and selling recyclables suddenly find it less expensive to throw away recyclables as garbage because tipping fees have fallen. They may be bound by mandatory recycling, but they may not be as vigilant about collecting all available recyclables if they are only saving \$50 per ton in disposal rather than \$120 per ton. As each organization supplies fewer tons of recyclables, the total supply will fall at any given price paid for those recyclables. This causes the supply curve to shift to the left. That means that at any given price for recyclables, fewer tons are being supplied. The result would be fewer tons recycled, but an increase in price would be predicted.

A decrease in the supply of recyclables



Increasing demand for recycled products

The two graphs *Increase in demand for recyclables* and *Decrease in supply of recyclables* show why “demand side” policies like “Buy Recycled” campaigns are so attractive. They increase both the price and the quantity recycled. That’s why they are so popular with recycling policy makers. However, increasing the demand for any product is easy to suggest, but difficult to accomplish because aggregate demand is the sum total of countless individual, uncoordinated decisions by buyers. The most creative marketing and advertising minds in the country are constantly experimenting with campaigns to increase demand for everything from cars to computers to corn chips.



Here are some ways that policy makers, recycling coordinators and all consumers can affect demand for recyclables.

Change consumer preferences

“Buy Recycled” campaigns and minimum-recycled-content legislation are all about increasing demand. These campaigns recruit or enlist buyers for all kinds of recycled products – from plumbing fixtures to parkas – so that at any given price, more recycled products will be bought in the marketplace. As a recycling coordinator, and as a consumer, you can help increase demand by choosing to buy recycled-content products. Economists tend to favor voluntary measures, such as “Buy Recycled” campaigns, over mandated purchasing regulations because voluntary campaigns expand rather than reduce consumer choice.

Change the prices of related goods

Pay-As-You-Throw (PAYT) solid waste pricing works on the premise that recycling is a substitute for garbage disposal. Demand for recycling service should increase when the cost of a substitute, garbage disposal, rises. In PAYT, consumers are charged for each can, bag or pound of garbage they generate. In traditional pricing systems, consumers pay a flat monthly fee (or the cost of this service may be hidden in their tax bill), so they pay no additional, or marginal, cost for setting out two cans a week rather than one. It costs consumers no more to put their mixed paper into the garbage can than into the recycling bin.

By charging consumers for each additional garbage can (or bag or pound), PAYT raises the cost of creating more garbage. That makes substitutes to garbage disposal – including waste prevention, composting, recycling, and unfortunately, illegal dumping – more financially attractive. Successful PAYT systems usually



combine convenient, comprehensive recycling programs with waste prevention education to encourage legal waste reduction. At the same time, they establish credible enforcement programs that include fines to raise the cost of illegal diversion. PAYT pricing complements mandatory recycling. It provides voluntary price incentives to encourage each household to maximize its participation in recycling and waste reduction programs, such as food and yard waste composting.

Promote changes in technology

Technological advances can make a big difference in recycling's bottom line. For example, plastics sorting equipment dramatically reduced the cost of processing post-consumer plastics. Cost-effective methods for turning plastic bottles collected at the curb into raw materials for manufacturers dramatically increased the demand for PETE and HDPE containers. This is a key reason the DEP has invested in research and technology development to spur demand for recycling.

***Increase incomes of buyers
and increase the number of buyers***

When mandatory recycling was implemented in 1987, the New Jersey Department of Environmental Protection also created low-interest loans to increase both the number and capacity of processors and end-users of recycled products. These subsidized loans reduced costs (which in turn increased net income) and increased the buying power of these firms. They also lowered the cost barrier to enter the market, which helped cultivate new buyers.



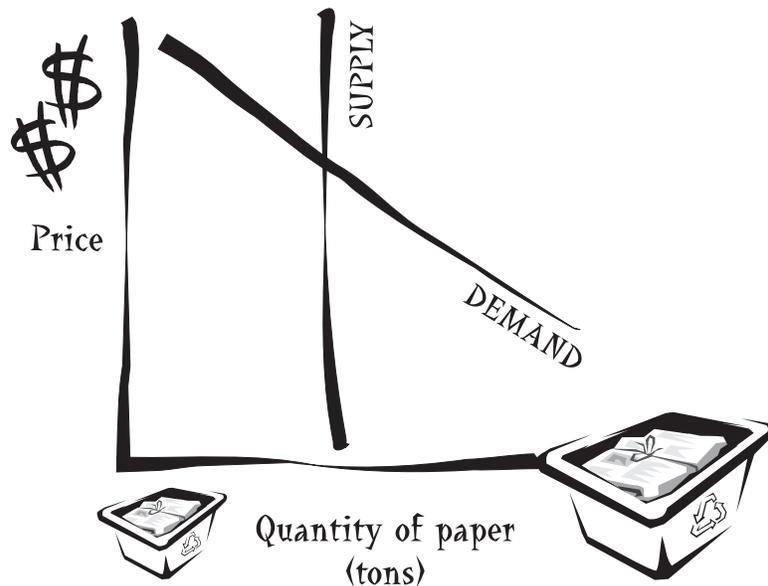
Economics in action: Mandatory recycling

How might markets react if states, counties and communities adopted mandatory recycling one after another in the Northeast as they did in the late 1980s and early 1990s? What does the supply “curve” look like with mandatory recycling?

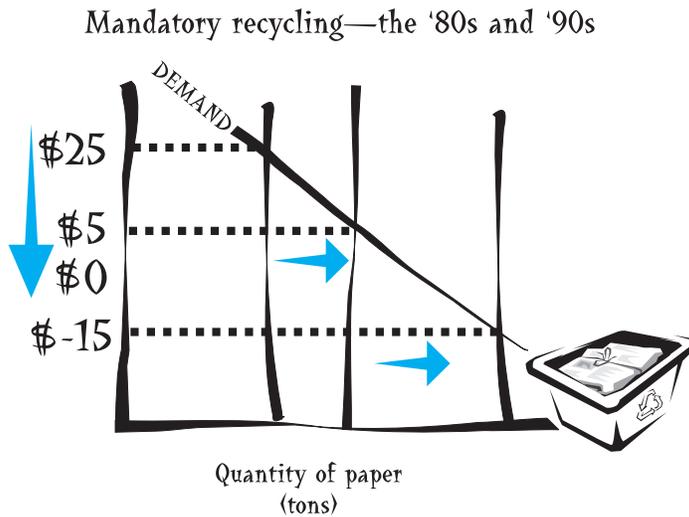
In a simplification of an exceedingly complex issue, it looks something like the graph *Mandatory recycling—simplified*.

The graph tells the following story: Because recycling is mandated, suppliers (those who collect recyclables and attempt to sell them) must provide them at any price. If your town produces 100 tons of office paper per year, you provide them to the market whether you get paid \$50 a ton or whether you have to pay \$50 to get it off your loading dock. So, the normal rule of supply – “sellers provide more goods at high prices and provide fewer at low prices” – no longer applies. Normally, as prices fall, suppliers will reduce the amount they are willing to sell. Mandatory recycling means they have to provide that supply as long as markets exist for it.

Mandatory recycling—simplified



What happens when neighboring states, counties or municipalities also mandate recycling? The graph *Mandatory recycling—the '80s and '90s* illustrates the changes in the market.



As the graph demonstrates, every time another municipality, county or nearby state adopts mandatory recycling, the supply curve shifts to the right. That is, for any given price, there will be more recycled material supplied. As each mandatory program adds its supply to the market, the supply curve moves further to the right (more quantity supplied at each price). If demand does not change, then the laws of supply and demand would predict the following scenario: steady increases in recycling tonnage while prices continually decline. That is exactly what happened in many recycling markets in the late 1980s and early 1990s.

In reality, the supply curve is not a straight, vertical line as drawn in the two graphs *Mandatory recycling* and *Mandatory recycling—the '80s and '90s*. Tonnage collected during the price euphoria of 1994-95 showed how creative recycling coordinators (and thieves looking for easy money) could be in finding new sources of recyclables. And when recycling prices turn negative, many communities and organizations do the bare minimum to meet mandatory recycling requirements. So, the supply curve in the real, complex world in fact does slant upward because the quantity supplied will increase as prices increase.

Reality is more complicated in other ways. Mandatory recycling alone did not cause falling prices for recyclables in the early 1990s. A severe recession hit both the East and West Coasts, which depressed prices for virgin and recycled commodities alike. A recession causes incomes of both firms and consumers to fall, and falling incomes usually lead to decreases in demand. Shipping demands created by the Gulf War interfered with export markets. Desperate for cash, the republics of the former Soviet Union flooded the market with virgin materials, putting further pressure on prices for recycled materials.

However, all other things being equal (which is the only way economists like to think), as more jurisdictions adopt mandatory recycling, markets for recyclables should experience an increase in the amount of materials recycled and a decrease in prices paid for those materials.



Pushing supply and pulling demand

Fortunately for New Jersey recycling coordinators, our policy makers did not simply mandate recycling and call it a day. The “New Jersey Statewide Mandatory Source Separation and Recycling Act” also created incentives to increase demand for recyclables. These included low-interest loans to processors and end-users of recyclables as well as investment in research to identify new, more cost-effective technologies to process and upgrade the value of recyclables. Working with recycling advocacy groups, such as the New Jersey Buy Recycled Business Network, the state has also organized “Buy Recycled” campaigns to increase the demand for recyclables.

With these tools, the state is simultaneously pursuing both a “supply push” strategy that mandates collection of recyclables and a “demand pull” policy that increases both the number and purchasing power of consumers of recycled products.



Notes:
