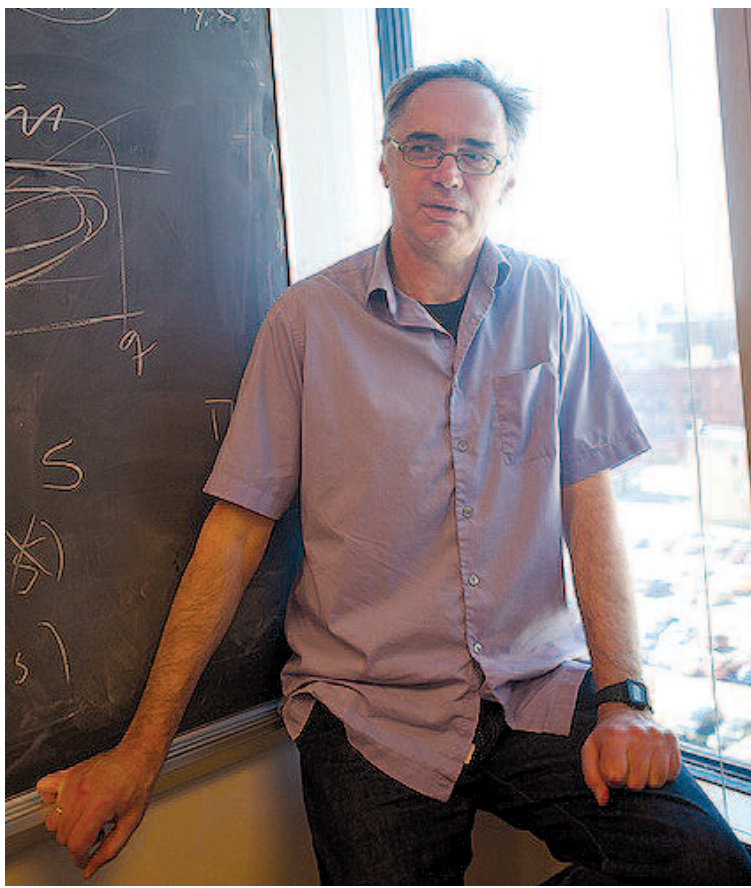


## Sweet productivity

*An interview with  
Minneapolis Fed economist  
James Schmitz*

*James Schmitz is a senior economist at the Federal Reserve Bank of Minneapolis and a visiting professor at the University of Minnesota. His research focuses on the sources of innovation and economic growth, often through historical case studies.*

*In a recent staff report (SR 437 online at [minneapolisfed.org](http://minneapolisfed.org)), he looked at sugar beet production and sugar refining, while in an earlier published paper, he studied iron ore mining, both of which are important industries in the Ninth District. Staff Writer Joe Mahon sat down with him to talk about his research.*



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**fedgazette:** What made you want to study the sugar business?

**James Schmitz:** Well, a big part of my research is thinking about the impact of competition, particularly its effects on productivity. And an interesting era for competition in U.S. history is the Depression era, because the U.S. government allowed manufacturing industries to cartelize, and I'm interested in the effect of that.

Now, in most industries, the cartels didn't last very long, but some cartels lasted a long time, like the sugar cartel, which lasted 40 years—from 1934 to 1974. That was the main thing that got me interested in the industry. It was a long period of time and there was a lot of data, from archives and other sources.

**fedgazette:** When you say "cartel," many people will think of drug cartels. But the sugar cartel was actually a legal cartel, set up by the government. Could you go over briefly how it worked, how exactly the cartel was structured?

**Schmitz:** It was run through the Department of Agriculture; they set up sales quotas every year for each firm. And they gave farmers quotas every year, tied to precartel acreage. Some of the

years it wasn't binding; after the Cuban Revolution, for example, [farmers] were allowed to grow whatever amount of beets they wanted for a few years.

Anyway, it was a pretty complicated system. I don't think we said it in the paper, but in one of the archives (at the University of Colorado, Boulder: the Great Western Sugar Company collection), I found this huge handbook of how the cartel was administered. A lot of it was done at the county level by farmers and representatives of the government. But it's a huge book, hundreds of pages. Through the handbook and other sources, we were able to figure out pretty well how the cartel worked.

**fedgazette:** By necessity, the quotas were supposed to keep out competitors. Were they successful in doing that?

**Schmitz:** Yes. Literally, I don't think any new firms entered, and the firms abided by their sales quotas.

**fedgazette:** You found that the cartel prevented production from moving geographically. How?

**Schmitz:** By giving quotas to farmers based on pre-existing acreage, the cartel locked beet production in place.

The provisions for firms didn't preclude them from closing a factory in one state and moving to another, but it wouldn't make sense to move somewhere with no beets to process.

**fedgazette:** There's now a lot of sugar production in the Ninth District, particularly in the Red River Valley, but there wasn't as much during the cartel years. Why was it that after this 40-year period, it became advantageous to produce sugar in the Midwest?

**Schmitz:** Well, the productivity of making sugar in North Dakota went up faster than in, say, California over the 40-year period. Let's make it very simple: Suppose the only input into making sugar was land, and it took one unit of land to make one unit of sugar in California and in North Dakota. And suppose in 1934 the price of a unit of land was the same in California as in North Dakota. So the physical productivity was the same, and the input price was the same. Now suppose in California the value of the land goes up faster than the value of the land in North Dakota. The opportunity cost—the alternative use of land—that's what's really determining its price. Well, California wasn't a very big economy in '34. But over the 40-year period, a lot of stuff happened in

California. A lot of cities were growing; a lot of agricultural land was becoming nonagricultural. And so the value of the land was going up faster than in North Dakota.

So in '74, you're still using one unit of land in California and North Dakota. But the cost of land was much higher in California. So if you get rid of this cartel, production moves from California to North Dakota. Productivity goes up in the sense that the cost of your inputs is going down.

**fedgazette:** There was also this tax-subsidy scheme, which you argue in the paper played a big role in distorting productivity. Can you explain how that worked?

**Schmitz:** The purported motivation for the subsidy was that since farmers are going to voluntarily abide by these quotas, we're going to give them a bonus, some subsidy. Now, Congress wanted that to be revenue-neutral, and that was part of the law actually. So they taxed the sugar coming out of factories—regardless of where the sugar was grown—to pay for those subsidies to farmers. The good news for the beet sugar industry was that a lot of taxes were paid by the sugar factories in New York, Baltimore and so on that processed raw cane sugar from Cuba

and other smaller foreign sources.

The subsidy to farmers, in turn, was based on the amount of sugar that they had in their crops. You measure that by taking the tons of beets and multiplying that by the percentage of sugar in an average ton. In the paper, we called it “sugar in the crop.”

The best way to think about it for the industry as a whole, when you consider the factories and the farms together, is that before the cartel, the only source of revenue to the industry came from processed sugar. Now there’s some revenue going to the industry based on how much sugar they had in their crops before extraction, and that’s going to affect the way they produce beets; it’s going to distort their decisions.

**fedgazette:** How were their decisions changed?

**Schmitz:** You can farm beets in such a way that you increase the tonnage of beets and the total amount of sugar in a crop, but at the same time, decrease the percentage of sugar in each beet. That’s what the industry did, and the quality of beets—their percentage of sugar—fell.

**fedgazette:** So that’s a theoretical story about how incentives changed for the industry. What evidence can you point to that the cartel did, in fact, distort decisions?

**Schmitz:** What’s interesting is you can see it in the national level; beet quality starts falling in ’34 when the cartel starts. I don’t know exactly how many factories there were back in 1934, on the order of 100. It turned out that we found information on a lot of these factories in archives all around the country.

Now, as an economist you ask, “Well, is quality falling in every factory?” And, in fact, it was happening at most factories. There were regional differences, and that’s one of the key things too.

You can drive up sugar in the crop, driving down beet quality in the process, by watering and fertilizing heavily in a certain part of the growing cycle, but restricting water closer to harvest, when more rainfall would just pump up the beets with water. It was easiest to manipulate quality in areas that were arid and had access to irrigation, such as California. And certainly in those areas you saw beet quality falling right away in all of the factories. In the Midwest, you have more difficulty manipulating quality since you don’t

*Switching over to new technologies or management practices can be costly to firms. If the transition disrupts production, say, if there’s a steep learning curve or a strike, the lost production can be costly. What’s the cost of that? Well, the cost is tied to lost sales revenue. You’re not going to do this during a period where prices are high; you’ll do it in a period where prices are pretty weak. Competition lowers prices, and so it lowers the opportunity cost of changing practices. That’s one idea.*

have control over the rain, and you don’t have irrigation either. So quality fell less in the Midwest. In the Chaska [Minn.] factory, I don’t think it fell at all.

**fedgazette:** The sugar cartel is over now, but there are import quotas and tariffs. Do you have any thoughts on how these contemporary protectionist measures might be affecting productivity in the industry?

**Schmitz:** The first thing I want to say is that I really focus on the period of the cartel which ended in 1974. But clearly, everything else equal, if you had more competition, productivity probably would go up. There’s still a little bit of sugar production in California, and if import quotas and tariffs were eliminated, that would probably go away. The sugar producers in our region I’m guessing are the most productive in the country. And so these other producers outside our region would have the hardest time.

I think we would knock the socks off the Europeans if we had to compete with them. There’s no North Dakota in Holland, when it comes to land values, and there’s no North Dakota in France. They’re using very valuable land for growing beets there. Europe actually makes tons of beet sugar, and they export tons of it. But we would knock their socks off because North

Dakota is a much more productive place to make sugar than the Netherlands, just given the land alone.

**fedgazette:** I want to talk about another industry you’ve studied that’s very important in the Ninth District, and that’s iron ore mining. Your research was on the historical productivity of this industry, but instead of cartelization, you looked at foreign competition. So what was your interest in the iron ore industry?

**Schmitz:** Well, in the 1980s, there had been a threat of competition from Brazil, and the industry increased its productivity pretty dramatically. And I was just simply trying to understand how it happened—how did they raise their productivity? So that’s sort of a classic question, I guess. We saw competition, and we saw productivity go up. Why?

A little esoteric point is that there really wasn’t a lot of increase in imports into the region during this period. In the models economists work with, the gains from trade are closely tied to how many imports come in. So these models completely miss the effect that you don’t have to have imports come in to see the benefits of competition. Some people lost their jobs, and that’s obviously not a benefit to those people. But in terms of the industry’s productivity, there were benefits.

We had the mine-level data in Minnesota, so we were able to ask whether industry productivity went up because they closed the least-productive mines. And that really was not a big factor. They only closed a couple mines, and one of those opened up again. It was just that they sort of reorganized work in the mines. They were able to increase their productivity a lot through changing their work rules.

**fedgazette:** What do you mean by work rules?

**Schmitz:** Well, for example, you might have a certain repair classification, and if you had that classification, you weren’t able to work on certain types of machines or certain other types of jobs, even if you might have been quite capable of doing the repair work. And a rule like that leads to lower productivity. Let’s say machines go down for some reason. You want to get them back up operating as quickly as possible, but if you have to wait to get the correct classification of worker there, the machine is down longer than it has to be.

There’s actually a great example of a

change in work rules in the paper—when the mines went to eyeball-to-eyeball crew relief.

**fedgazette:** What’s that?

**Schmitz:** When you had crew relief before the Brazilian threat, you brought small vans around to pick people up on their blasting equipment and ore-hauling trucks, and you brought them back to a central location. And then you filled up the vans with new people, and you took them out to the equipment. So the equipment is idle as you’re changing shifts.

Now, suppose you took the new crew out to the machines in the same vans and dropped them off as you picked up the old crew. The crews pass eyeball-to-eyeball. Before the threat of foreign competition, some of the mines were not eyeball-to-eyeball, and they changed in response. Very little has changed in the mine itself, you’re just getting more output.

**fedgazette:** How is it that just the mere threat would have initiated these changes in management practices?

**Schmitz:** There are some ideas that Tom Holmes and David Levine and I had. Switching over to new technologies or management practices can be costly to firms. If the transition disrupts production, say, if there’s a steep learning curve or a strike, the lost production can be costly. What’s the cost of that? Well, the cost is tied to lost sales revenue. You’re not going to do this during a period where prices are high; you’ll do it in a period where prices are pretty weak. Competition lowers prices, and so it lowers the opportunity cost of changing practices. That’s one idea.

But it still doesn’t get into why management and workers couldn’t agree to things like eyeball-to-eyeball crew relief in the first place.

**fedgazette:** So the puzzle is if there were these potential gains to productivity, why were they not being exploited?

**Schmitz:** Yes. Obviously, management, employees and the union could not reach agreements to achieve these productivity gains. The puzzle is why not, and there’s no good answer for that.

**fedgazette:** Thanks for talking with us, Jim.

—Joe Mahon