



# Retail price concentration, transaction costs, and price flexibility circa 1900

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## Abstract

This paper studies a unique 1901 data set containing prices of three products obtained from grocery stores in over 1400 cities nationwide. A striking characteristic is a high concentration of retail prices at relatively few “even” numbers. I propose a novel transactions cost explanation for this phenomenon on which existing theory is silent. In particular, grocers selected prices that simplified the task of totting up customer bills by hand and reduced related costs. As stores independently adopted this strategy across the country, prices converged to a few even numbers. Several empirical regularities for all three products are consistent with this explanation. An important implication is that preferences for computationally convenient prices would have made prices “sticky.” An independent study of price flexibility *circa* 1890 supports this hypothesis. The underlying data show price concentration patterns similar to the 1901 data, suggesting that the phenomenon covered a wide range of products.

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## 1. Introduction

This paper studies a unique data set created by a US federal government survey conducted and published in 1901. The survey contains retail and wholesale prices of three products sold at more than 1500 grocery stores located in over 1400 cities and towns

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nationwide. A striking characteristic of the data is a high concentration of retail prices at relatively few “even” numbers. For one product, three prices account for 56% of stores (10, 12, and 15 cents), and for a second three prices account for 59% (6,  $6\frac{1}{2}$ , and 7 cents). The most dramatic case involves only two prices accounting for 91% of stores (45 and 50 cents). I propose a transactions cost explanation for this phenomenon. In particular, since computing devices were still rare circa 1900, grocers selected even-number prices to simplify the task of toting up customer bills by hand and making change, and reduce related costs. As stores independently adopted this strategy across the country, prices converged to a few even numbers.

Existing economic theory, such as the “law of one price,” predicts concentrated prices *within* markets.<sup>1</sup> Absent search costs, competition compels sellers to charge a single price (equal to their common supply cost); i.e., there should be zero dispersion or perfect concentration. The first point is that the argument applies to individual markets, i.e., it cannot explain high concentration *across* markets. A large number of localities throughout the country could have a large number of different prices (low concentration), even if only one price exists within each market (perfect concentration). Second, the theory says nothing about the *particular* “one price” that should obtain. For example, it says nothing about the relative frequency of markets that might converge to a price of  $6\frac{3}{8}$  versus  $6\frac{1}{2}$ , or  $14\frac{1}{2}$  versus 15, or 49 versus 50 cents. It is these issues that motivate the present paper.

Empirical regularities in the price distributions for all three products are consistent with economizing on computation-related transactions costs. For example, among prices that include fractions, “even” fractions are preferred (e.g.,  $6\frac{1}{2}$  cents). Moving from lower to higher prices, integers replace fractions, then nickel prices replace other integers. Also, the data indicate that even-numbered retail prices were not simply an artifact of adding even markups to even wholesale prices. Among other findings, profit margins are broadly comparable to similar modern products, and the percentage markups over wholesale prices and implied elasticities are consistent with profit maximization by retailers and the nature of the product (i.e., commodity or branded). Also, there is no evidence of demand-based “pricing points,” as apparently exist today.

These findings may be the first evidence of a cost of *changing* price that existed prior to the introduction of computing devices and is not present in modern times. Retailers interested in maintaining even-numbered prices would be reluctant to alter them unless demand or supply (cost) changes were large enough to warrant a move to another even price. The upshot would be “sticky” prices characterized by a reduced sensitivity to fluctuating market conditions.<sup>2</sup> Such fluctuations therefore would have a greater impact on quantities produced and sold. If sufficiently widespread, the phenomenon would exacerbate the output and employment effects of economic downturns, making recessions of the era deeper and longer than otherwise. The implication that prices were less flexible a century ago

<sup>1</sup> This literature originated with Stigler (1961). See Eckard (2004) and references cited therein for more recent work. While price dispersion (e.g., variance) is the usual focus of law-of-one-price work, dispersion is simply an inverse measure of concentration.

<sup>2</sup> For a general review of the substantial theoretical and empirical literature on “sticky” or “rigid” prices associated with positive price-change costs, see Carlton and Perloff (2004, Chapter 17), “How Markets Clear: Theory and Facts.” The desire to maintain computationally convenient prices might be an example of “near-rational behavior” discussed in Akerlof and Yellen (1985). They present a model in which “small transactions costs of . . . changing price” (p. 823) can cause aggregate demand shocks to produce “significant changes in output and employment” (p. 823).

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