



NAFTA, the USMCA, and Ford Motor Company: An Exploratory Comparison of Cost of Revenue Before and After Trade-Agreement Implementation

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Abstract: This study examines whether Ford Motor Company's reported cost of revenue differed between periods surrounding implementation of the North American Free Trade Agreement (NAFTA) and the United States-Mexico-Canada Agreement (USMCA). Inflation-adjusted annual cost-of-revenue observations were assembled from Bloomberg for windows surrounding each agreement and compared using one-way analysis of variance. In the NAFTA comparison, the post-agreement mean exceeded the pre-agreement mean by 10,643.44 in the reported units, and the difference was statistically significant in the original analysis (two-tailed $p = .011$). In the USMCA comparison, the post-agreement mean exceeded the pre-agreement mean by 2,018, but the difference was not statistically significant (two-tailed $p = .811$). These results do not establish that either trade agreement caused changes in Ford's costs. Rather, they show that the expected reduction in company-level cost of revenue is not evident in these descriptive pre/post comparisons. The study contributes a company-level perspective to research on North American trade policy while demonstrating the interpretive limits of using a single accounting outcome and short, unequal policy windows. Implications for trade-policy evaluation and directions for stronger longitudinal research are discussed.

Keywords: NAFTA, USMCA, Ford Motor Company, automotive industry, cost of revenue, trade policy

INTRODUCTION

North American automotive production is organized through cross-border supply chains in which vehicles, components, raw materials, and labor may be distributed among the United States, Mexico, and Canada. Trade agreements shape this system through tariff treatment, rules of origin, and labor-related provisions. NAFTA reduced barriers to regional trade, whereas the USMCA retained the trilateral framework while imposing more demanding automotive content and labor rules. These institutional differences make the automotive sector a useful setting for examining whether broad trade-policy changes are reflected in company-level operating costs.

Prior discussion of NAFTA and the USMCA has focused heavily on national trade flows, employment, labor governance, and industry-wide effects. Less attention has been given to a narrow but practically important question: whether a major manufacturer's reported production-related costs declined after implementation. Ford Motor Company provides a salient case because it operates within an integrated North American production network and reports cost-of-revenue data across both policy periods.

This study compares Ford's inflation-adjusted cost of revenue before and after the implementation periods used in the original conference analysis. Cost of revenue was selected rather than a narrower cost-of-goods-sold concept because it captures a wider set of costs associated with generating revenue, including costs relevant to manufacturing and distribution. The analysis addresses two questions:

- RQ1: Did Ford's mean cost of revenue differ between the pre-NAFTA and post-NAFTA observations?
- RQ2: Did Ford's mean cost of revenue differ between the pre-USMCA and post-USMCA observations?

The article makes a deliberately limited contribution. It does not estimate the causal effect of either agreement. Instead, it evaluates whether the descriptive pattern in Ford's cost data is consistent with the expectation that regional trade liberalization or renegotiation would be followed by lower company-level costs. Reframing the conference proceeding in this way aligns the statistical evidence with claims that the design can support.

POLICY AND INDUSTRY BACKGROUND

From NAFTA to the USMCA

NAFTA emerged from a period of regional economic integration that included the earlier Canada-United States Free Trade Agreement. The agreement joined economies with substantial differences in size, income, and wage levels, prompting debate over whether production and employment would move toward lower-cost locations. Villarreal and Fergusson (2017, 2020) describe both the historical development of NAFTA and its replacement by the USMCA. Flores-Macías and Sánchez-Talanquer (2019) place the transition within the wider political economy of North American trade. Labor governance was also central to the evolution of the agreements. NAFTA itself was supplemented by the North American Agreement on Labor Cooperation. Campos Ortiz (2019) explains how the side agreement recognized labor principles but relied substantially on domestic enforcement. Later assessments have questioned the strength of transnational labor regulation under this architecture (Witzak, 2025). The USMCA responded with more explicit and enforceable labor commitments.

Automotive Provisions and Firm-level Costs

The USMCA increased the regional value-content requirement for passenger vehicles and light trucks from 62.5% under NAFTA to 75% and added requirements concerning North American steel and aluminum. It also introduced a labor-value-content mechanism tied to production performed at specified wage levels. These rules were designed to increase regional sourcing and support higher-wage production, but compliance can also create adjustment, documentation, sourcing, and production costs. Hudson (2021) argues that firms may compare the costs of compliance with the costs of alternative sourcing arrangements, including tariff exposure.

The USMCA's automotive provisions have also generated disputes over how regional content should be calculated. Contemporary coverage characterized an automobile country-of-origin dispute among the three USMCA parties as a practical test of the agreement's mechanisms and whether the panel process could produce identifiable, actionable, and timely remedies ("Automobile Industry's Country-of-Origin Dispute," 2021). This implementation context illustrates that the effects of automotive trade rules depend not only on their formal requirements but also on how those requirements are interpreted and enforced. The theoretical effect on Ford's cost of revenue is therefore ambiguous. Reduced trade barriers and regional integration can lower some transaction and sourcing costs. Conversely, stricter content rules, labor requirements, logistical complexity, macroeconomic shocks, changes in product mix, and commodity prices can increase reported costs. A simple pre/post test can identify a difference in means, but it cannot isolate these competing mechanisms.

METHOD

Data and Outcome

The original conference study compiled Ford annual cost-of-revenue data from Bloomberg for 1987-1997 in the NAFTA analysis and 2013-2023 in the USMCA analysis. Monetary values were reported as inflation-adjusted to a 2000 base year. The retained summary tables indicate six observations in both the pre- and post-NAFTA groups, eight observations in the pre-USMCA group, and four observations in the post-USMCA group. Because those group counts do not correspond to symmetrical five-year windows, the present article reports the windows and sample sizes transparently rather than describing both comparisons as balanced five-year tests.

Analytical Strategy

For each agreement, the original analysis compared the pre-implementation and post-implementation group means using one-way analysis of variance (ANOVA) at $\alpha = .05$. With two groups, the omnibus ANOVA tests whether the group means differ; it does not by itself establish that policy implementation caused the difference. The original analysis also considered normality of residuals using the Shapiro-Wilk test and reported that conclusions were unchanged under unequal-variance treatment. Given the very small samples, all inferential results should be interpreted as exploratory.

- H01: Mean Ford cost of revenue does not differ between the pre-NAFTA and post-NAFTA groups.
- H02: Mean Ford cost of revenue does not differ between the pre-USMCA and post-USMCA groups.

RESULTS

NAFTA Comparison

The mean for the post-NAFTA group was 121,696.77, compared with 111,053.33 for the pre-NAFTA group. The reported mean difference was 10,643.44. The original ANOVA indicated

a statistically significant difference between the groups (two-tailed $p = .011$). Thus, H_0 was rejected. The direction of the difference was opposite to the cost-reduction expectation: cost of revenue was higher, not lower, in the post-NAFTA observations.

Table 1: Descriptive statistics for the NAFTA comparison

Period	n	Mean	SD
Pre	6	111,053.33	2,539.14
Post	6	121,696.77	5,503.89

Table 2: Inferential result for the NAFTA comparison

Outcome	Two-tailed p	Mean difference
Cost of revenue	.011	10,643.44

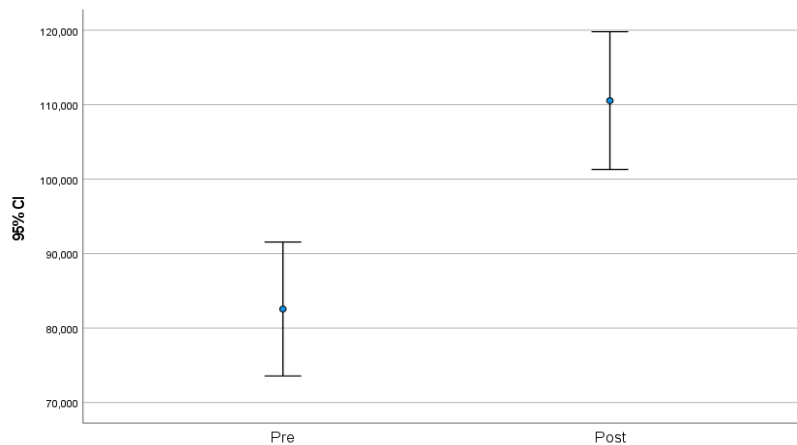


Figure 1: Reported 95% confidence intervals for Ford cost of revenue before and after NAFTA.

USMCA Comparison

The mean for the post-USMCA group was 135,546.50, compared with 133,528.50 for the pre-USMCA group. The reported mean difference was 2,018. The original ANOVA did not indicate a statistically significant difference (two-tailed $p = .811$).

Table 3: Descriptive statistics for the USMCA comparison

Period	n	Mean	SD
Pre	8	133,528.50	10,200.73
Post	4	135,546.50	18,921.59

Table 4: Inferential result for the USMCA comparison

Outcome	Two-tailed p	Mean difference
Cost of revenue	.811	2,018.00

H02 was therefore not rejected. The available evidence does not demonstrate either a reduction or an increase in Ford's cost of revenue associated with the USMCA comparison.

DISCUSSION

The results do not support a simple proposition that implementation of NAFTA or the USMCA was followed by lower Ford cost of revenue. The NAFTA comparison produced a statistically significant increase in the reported outcome, whereas the USMCA comparison produced a small, statistically nonsignificant difference. This distinction is important. The data support describing the NAFTA groups as different and the USMCA groups as not detectably different; they do not support concluding that both agreements negatively affected Ford.

Several interpretations are possible, but none can be selected from this design alone. Ford's reported costs may reflect production volume, product mix, input prices, exchange rates, transportation costs, capital investment, supply-chain restructuring, labor costs, accounting practices, and macroeconomic conditions. The post-USMCA period is particularly difficult to interpret because it overlaps with major supply-chain disruption and contains fewer observations than the pre-period. Accordingly, policy implementation should be treated as the timing marker for these comparisons rather than as an identified causal treatment.

Even with these constraints, the company-level perspective is useful. National gains from trade and firm-level accounting outcomes are not equivalent. A trade agreement may generate benefits through market access, sourcing flexibility, investment certainty, or regional resilience even when a single cost measure does not decline. Conversely, lower tariffs do not guarantee lower total cost when compliance and operational adjustments are considered. The results therefore encourage multi-dimensional evaluation of trade policy rather than reliance on a single macroeconomic or company-level indicator.

Implications for Policy and Management

For policymakers, the study highlights the need to evaluate implementation costs alongside intended benefits. Rules of origin and labor-value requirements may pursue legitimate regional-development goals while also affecting sourcing and compliance decisions. For managers, the findings reinforce the importance of modeling trade-policy changes at the supply-chain and product-platform levels rather than assuming that tariff preferences will translate automatically into lower total costs.

LIMITATIONS AND FUTURE RESEARCH

This study has six major limitations. First, it analyzes one company and one accounting outcome. General Motors was initially considered as a second automotive case, but its 2009 Chapter 11 bankruptcy and subsequent reorganization created a discontinuity between the predecessor and successor companies' financial reporting. Although General Motors released financial information, a sufficiently comparable cost-of-revenue series spanning the study periods could not be constructed within the scope of this project. The single-company design therefore limits the generalizability of the findings beyond Ford. Second, the samples are

small, and the USMCA groups are unequal. Third, the retained group counts do not constitute symmetrical five-year windows, despite the wording used in the conference version. Fourth, a pre/post ANOVA does not control for time trends, inflation-measurement choices, production volume, recessions, exchange rates, commodity prices, product mix, firm strategy, or other shocks. Fifth, the analysis does not provide a counterfactual showing what Ford's costs would have been without either agreement. Sixth, although the financial data were reported as adjusted for general inflation to a 2000 base year, the analysis did not separately account for differences or changes in cost of living, purchasing power, and wage structures across the United States, Mexico, and Canada. These conditions could influence Ford's reported cost of revenue independently of trade-agreement provisions, further limiting causal interpretation of the pre/post comparisons.

Future research should reconstruct the annual dataset and document every transformation, including reporting units and the inflation index used. A stronger design would analyze cost of revenue relative to revenue or vehicles sold, include additional North American manufacturers, and use a longer time series. Interrupted time-series models, difference-in-differences comparisons, and robustness tests around alternative implementation dates would improve causal interpretation. Researchers should also distinguish between provisions that reduce trade barriers and provisions that impose regional-content, labor, and documentation requirements.

CONCLUSION

Ford's reported cost of revenue was significantly higher in the post-NAFTA group than in the pre-NAFTA group, while the pre- and post-USMCA groups were not statistically distinguishable in the original analysis. The evidence therefore does not show that either agreement was followed by lower Ford cost of revenue. At the same time, the design cannot attribute the observed differences to trade policy. The appropriate conclusion is narrower but more defensible: company-level cost outcomes may diverge from broad expectations about the benefits of trade agreements, and stronger longitudinal, comparative research is required to determine why.

DECLARATIONS

Artificial intelligence disclosure: Generative artificial intelligence tools were used during manuscript development to assist with language editing, organizational structure, formatting, and critical review of the manuscript. The authors reviewed, revised, and verified all content, interpretations, statistical results, citations, and conclusions. The authors accept full responsibility for the accuracy, originality, and integrity of the final manuscript.

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