The Potential Economic and Fiscal Cost of Removing Caps on Noneconomic Damages in Colorado

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American Property Casualty Insurance Association

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Contents

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Executive Summary

- The civil justice system is crucial to the proper functioning of society and the economy. Initiatives that enhance the predictability of the civil justice system can lead to significant economic benefits, and states that have implemented reforms have seen enhanced judicial efficiency and measurable improvement in economic performance. On the other hand, actions that increase the potential for imbalances can lead to substantial economic and fiscal costs.

- Current efforts in Colorado seek to remove caps on noneconomic damages which could lead to costly imbalances that would ultimately be borne by the people and businesses of the state.

- The Perryman Group's baseline estimates indicate that the potential annual cost to the Colorado economy of removing noneconomic damages caps would be almost **$2.1 billion** in gross product and **15,500** jobs including multiplier effects.

- These losses represent a reduction in economic output (gross product) due to excess civil justice costs of **$357** per person in Colorado (or **$921** per household) under the baseline case.

- Business activity generates tax revenue. The Perryman Group estimates that the potential annual decrease in tax receipts would include approximately **$101.9 million** to the State of Colorado and almost **$78.3 million** to local government entities across the state in the baseline case.

- Potential future economic development could also be negatively affected, decreasing opportunities and prosperity over time.

- Increasing litigation risk in a manner that leads to random and uncertain outcomes including excessive, or "nuclear," verdict outcomes increases the costs of doing business and will impose substantial short-term and long-term harms to Colorado and its citizens.

Introduction

The civil justice system is crucial to the proper functioning of society and the economy. The purpose of the system is to provide a fair and equitable forum for the resolution of disputes among parties, appropriately compensating those who have legitimately been harmed.

When imbalances in the civil justice system occur, the expense associated with insuring individuals and firms against the risk of exorbitant damages awards rises, leading to higher costs for goods and services across the economy. These costs are ultimately borne by consumers through higher prices.

However, it is possible for the system to become imbalanced through flaws such as generating exorbitant levels of damages or numbers of awards. In addition, unpredictable outcomes contribute to negative impacts through the misallocation of society's scarce economic and human resources.

When such imbalances occur, the expense associated with insuring individuals and firms against the risk of exorbitant damages awards rises, leading to higher costs for goods and services across the economy. These costs are ultimately borne by consumers and workers through higher prices, reduced income, and lost jobs.

The Perryman Group has studied the costs of excessive verdicts on a number of occasions and estimated that the reduction in gross product on a per capita basis due to these excessive civil justice costs was $1,561 in the US in 2022.[1] In Colorado, the estimated costs were even higher at $1,875 as of 2022.[2]

Initiatives that enhance the predictability of the civil justice system can lead to substantial economic benefits, and states that have implemented reforms, such as noneconomic damages limitations, have

[1] Economic Benefits of Tort Reform, An Assessment of Excessive US Tort Costs and Potential Economic Benefits of Reform, The Perryman Group, 2023.
[2] Economic Benefits of Tort Reform, An Assessment of Excessive US Tort Costs and Potential Economic Benefits of Reform, The Perryman Group, 2023.

seen improved judicial efficiency and measurable improvement in economic performance. On the other hand, actions that increase the potential for imbalances can lead to economic and fiscal costs.

Current efforts in Colorado seek to remove caps on noneconomic damages, which are the portion of damages awarded to attempt to compensate for an injured person's emotional distress and suffering related to an accident. Such awards are separate from economic damages, which seek to restore an injured person to their original financial condition (and, in most cases, economic damages are not capped).

The economic costs of excessive noneconomic damages are high and will ultimately be borne by individuals, families, and businesses across the state. The purpose of this study is to quantify the potential economic and fiscal costs associated with elimination of caps on noneconomic damages in Colorado.

The Importance of Caps on Noneconomic Damages

Limits on noneconomic damages vary by state and by type of claim. States may have limits on noneconomic damages for personal injury claims. Others have total caps that limit both economic and noneconomic damages.[3] A more common type of cap involves punitive damages, and some states have caps on wrongful death claims.[4]

A report from the Congressional Budget Office in 2004 analyzed numerous studies on the impact of various types of tort reform.[5] One section of the report evaluated the effects of tort reform legislation on the liability insurance market. The studies reviewed indicated that insurers in states with caps on noneconomic damages had lower loss ratios and charged lower premiums than insurers in other states.[6]

Many studies show the benefits of civil justice reform and caps on noneconomic damages.

Another study used the estimated survivability probability of civil justice reform to examine the impact of tort reform on state liability insurance markets.[7] The study found that premiums are inversely

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[3] States with caps limiting various types of damages (other than medical malpractice) include Alabama, Alaska, Arizona, Colorado, Connecticut, Florida, Georgia, Hawaii, Idaho, Iowa, Indiana, Kansas, Maine, Maryland, Mississippi, Montana, Nevada, New Hampshire, New Jersey, Nebraska, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Wisconsin, Virginia, and West Virginia.

[4] Note that many states also have caps on noneconomic damages for medical malpractice. For a listing of medical malpractice and related caps by state, see State Laws Chart I: Liability Reforms, American Medical Association Advocacy Resource Center, https://www.ama-assn.org/system/files/mlr-state-laws-chart-I.pdf, 2024.

[5] The Effects of Tort Reform: Evidence from the States, The Congress of the United States, Congressional Budget Office, June 2004.

[6] The Effects of Tort Reform: Evidence from the States, The Congress of the United States, Congressional Budget Office, June 2004.

[7] Grace, Martin F. and J. Tyler Leverty, How Tort Reform Affects Insurance Markets, March 1, 2010.

related to the likelihood that a reform will survive judicial challenges and that tort reforms reduce premiums.[8]

Many studies show the benefits of civil justice reform and caps on noneconomic damages. For example, a study on the cap on noneconomic damages in Texas found the cap reduced "allowed noneconomic damages by an estimated 73 percent, allowed verdicts by 38 percent, and payouts by 27 percent. In settled cases, the estimated decline in payouts is 18 percent."[9] It also concluded, based on a simulation of caps, that there is a large variation in cap impact depending on how the cap is designed, with caps on total damages having an especially large impact.[10]

The potential increase in non-medical damages and noneconomic damages caps for medical professional liability cases in New Mexico has also been examined.[11] The analysis included various scenarios based on differing cap changes, concluding that cap increases or removal of noneconomic caps would lead to a notable increase in loss and allocated loss adjustment expense (ALAE) costs in New Mexico. Depending on the specific changes in cap but with removal of the noneconomic damages cap the total effect on loss and pure premium ALAE was an expected increase from 35.9% to 73.8% for the central estimate.[12]

A recent bill in the Maryland State Senate would eliminate Maryland's statutory limits on noneconomic damages in personal injury cases and allow unlimited pain and suffering awards outside of healthcare liability

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[8] Grace, Martin F. and J. Tyler Leverty, How Tort Reform Affects Insurance Markets, March 1, 2010.
[9] Hyman, David A., Bernard Black, Charles Silver, and William M. Sage, Estimating the Effect of Damages Caps in Medical Malpractice Cases: Evidence from Texas, Journal of Legal Analysis, Winter 2009: Volume 1.
[10] Hyman, David A., Bernard Black, Charles Silver, and William M. Sage, Estimating the Effect of Damages Caps in Medical Malpractice Cases: Evidence from Texas, Journal of Legal Analysis, Winter 2009: Volume 1.
[11] Increase in New Mexico Cap on Damages Analysis of Effect on Loss and ALAE Costs, Milliman Client Report, for the Doctors Company, November 3, 2020.
[12] Increase in New Mexico Cap on Damages Analysis of Effect on Loss and ALAE Costs, Milliman Client Report, for the Doctors Company, November 3, 2020.

claims.[13] Testimony before the Maryland Senate committee indicated the change would:

- complicate the ability to reach reasonable settlements, since plaintiffs' lawyers will demand significantly higher amounts for immeasurable harm and some may hold out for the chance of a jackpot verdict,
- lead to more frequent excessive verdicts for a wide range of businesses and nonprofit organizations and lengthy appeals, and
- result in higher insurance costs for Maryland drivers, homeowners, and businesses.[14]

Another study reviewed the increasing size of punitive damages and excessive, or "nuclear," verdicts which it defined as verdicts awarded larger than $100 million.[15] It indicated the number and size of punitive damage awards has grown considerably, with 24 verdicts in excess of $100 million in 2021, with the awards totaling $309 billion and having a median of $175.0 million.[16] The study indicates several potential adverse effects of these verdicts. For example, they may reduce funds available to companies for safety and mitigation strategies, discourage innovation, lead to greater out-of-pocket insurance and claims costs for consumers and businesses, or lead to bankruptcy. Additionally, nuclear verdicts could reduce the capacity of the global insurance market.[17]

A similar study analyzed excessive verdicts in personal injury and wrongful death cases over a 10-year period, defining them as jury verdicts of $10 million or more.[18] This report also found that these

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[13] Silverman, Cary, On Behalf of the American Tort Reform Association, Testimony Before the Maryland Senate Judicial Proceedings Committee in Opposition to S.B. 538, A Bill That Would Allow Unlimited Pain & Suffering Awards in Personal Injury and Wrongful Death Cases, February 16, 2024.
[14] Silverman, Cary, On Behalf of the American Tort Reform Association, Testimony Before the Maryland Senate Judicial Proceedings Committee in Opposition to S.B. 538, A Bill That Would Allow Unlimited Pain & Suffering Awards in Personal Injury and Wrongful Death Cases, February 16, 2024.
[15] Cole, Casandra and Chad Marzen, Nuclear Verdicts, Tort Liability, and Legislative Responses, Journal of Insurance Regulation, 2023.
[16] Cole, Casandra and Chad Marzen, Nuclear Verdicts, Tort Liability, and Legislative Responses, Journal of Insurance Regulation, 2023.
[17] Cole, Casandra and Chad Marzen, Nuclear Verdicts, Tort Liability, and Legislative Responses, Journal of Insurance Regulation, 2023.
[18] Nuclear Verdicts Trends, Causes, and Solutions, US Chamber of Commerce Institute for Legal Reform, September 2022.

types of verdicts are increasing in both amount and frequency.[19] The analysis indicates nuclear verdicts "can have devastating impacts on businesses, entire industries, and society at large, even when a verdict is later thrown out or substantially reduced by an appellate court. These verdicts can drive up the costs of goods and services, adversely affect the cost and availability of insurance, and undermine fundamental fairness and predictability in the rule of law."[20]

These results collectively indicate excessive noneconomic damage awards can have negative effects in a variety of ways. They can reduce insurance availability, discourage business formation or eliminate business operations, and lead to notable cost increases for insurance coverage. Higher costs of insurance are spread across the economy, leading to price increases and other allocation issues. A reasonable cap on noneconomic damages helps ensure the civil justice system remains balanced, benefiting individuals, businesses, and society as a whole.

[19] Nuclear Verdicts Trends, Causes, and Solutions, US Chamber of Commerce Institute for Legal Reform, September 2022.
[20] Nuclear Verdicts Trends, Causes, and Solutions, US Chamber of Commerce Institute for Legal Reform, September 2022.

Economic Effects

Any economic stimulus leads to dynamic responses across the economy. The Perryman Group has developed complex and comprehensive models over the past four decades to measure these dynamic responses. In this instance, removing caps on noneconomic damages involves higher costs across the economy, reducing productive activity.

Any economic stimulus leads to dynamic responses across the economy.

As an initial phase of this analysis, The Perryman Group estimated the potential direct costs of removing caps on noneconomic damages by industry based on detailed data related to insurance costs by industry, studies of outcomes in other areas, and the firm's extensive databases and systems.

More specifically, data from the US Census Bureau's County Business Patterns was merged with data from the Bureau of Economic Analysis of the US Department of Commerce in order to obtain an estimate of the total costs associated with property and casualty insurance. This phase of the modeling effort resulted in baseline estimates for Colorado as of 2021 (the latest year for which data was available). The Perryman Group's US Multi-Regional Econometric Model (which is described in Appendix A) was then used to project these costs for 2023 based on changes in the state economy since that time. Direct costs were then allocated across 500 industry sectors based on typical insurance costs by industry using the coefficients from The Perryman Group's US Multi-Regional Impact Assessment System (described in Appendix A). The result was an allocation across the economy of total estimated current direct costs of property and casualty insurance.

In order to test this phase of the modeling process, these allocated direct costs of insurance (which provide a measure of total output/gross product for insurance) were compared to the portion of total expenditures by industry which were for insurance. These two approaches to measuring output/gross product for insurance were found to yield virtually identical results, supporting the validity of the approach.

The next phase of the analysis involved reviewing empirical analyses of the added cost of insurance in areas without caps on noneconomic damages. After reviewing a number of evaluations, an assessment by the Robert Wood Johnson Foundation was judged to be appropriate for this analysis.[21] This study examined an array of analyses and found that they indicated reductions in awards for noneconomic damages ranging from 23% to 31% for states studied. The mean direct cost increase was used in defining incremental costs in the baseline case, with the low and high ends of the range forming the lower bound and upper bound cases. Note that use of this assessment introduces an element of conservatism; as noted in the prior section, many other analyses have indicated higher cost increases in the absence of caps. These incremental costs represent a deadweight loss to the economy that will be borne by businesses and consumers within the state.

Once the direct effects were estimated, the total (not only direct, but also downstream) impacts were quantified based on the incidence allocation described above. Methods used in this analysis are summarized on the following page, with substantial additional detail in Appendix A. Results by industry are presented in Appendix B.

[21] Mello, Michelle M., Research Synthesis Report No. 10—Medical Malpractice: Impact of the Crisis and Effect of State Tort Reforms, The Robert Wood Johnson Foundation, May 2006.

Measuring Economic Effects

Any economic stimulus, whether positive or negative, generates multiplier effects throughout the economy. In this instance, higher insurance costs associated with removing caps on noneconomic damages reduces productive activity across the economy. The resulting decrease in economic activity has notable negative effects on tax receipts to State and local governments.

The Perryman Group's dynamic input-output assessment system (the US Multi-Regional Impact Assessment System) and comprehensive forecasting system (the US Multi-Regional Econometric Model), which are described in further detail in the Appendices to this report, were developed by the firm about 40 years ago and have been consistently maintained and updated since that time. These models have been used in hundreds of analyses for clients ranging from major corporations to government agencies and have been peer reviewed on multiple occasions. The impact system uses a variety of data (from surveys, industry information, and other sources) to describe the various goods and services (known as resources or inputs) required to produce another good/service. This process allows for estimation of the total economic impact (including multiplier effects) of the proposed policies. The models used in the current analysis reflect the specific industrial composition and characteristics of Colorado.

Total economic effects are quantified for the key measures of business activity described below (further explained in Appendix A). Note that these are different ways of looking at the same economic effects; they are not additive.

- **Total expenditures** (or total spending) measure change in the volume of dollars changing hands as a result of the economic stimulus.
- **Gross product** (or output) is the change in the level of production of goods and services in the area as a result of the stimulus. This measure is parallel to the gross domestic product numbers commonly reported by various media outlets and is a subset of total expenditures.
- **Personal income** reflects dollars that end up in the hands of people in the area; the vast majority of this aggregate derives from the earnings of employees, but payments such as interest and rents are also included.
- **Jobs** are expressed on a full-time-equivalent basis for ongoing effects or job-years (one person working for one year, though it could be multiple individuals working partial years) for temporary stimuli such as construction.

Monetary values were quantified on a constant (2023) basis to eliminate the effects of inflation. See Appendix A for additional information regarding the methods and assumptions used in this analysis.

The Perryman Group's baseline estimates indicate that the potential annual cost to the Colorado economy of removing noneconomic damages caps would be almost **$2.1 billion** in gross product and **15,500** jobs including multiplier effects.

The Potential Annual Economic Cost of Removing Caps on Noneconomic Damages in Colorado

	Total Expenditures (Billions of 2023 Dollars)	**Gross Product** (Billions of 2023 Dollars)	**Personal Income** (Billions of 2023 Dollars)	**Employment**
Low Case	($3.585)	($1.695)	($0.903)	(12,491)
Baseline	**($4.439)**	**($2.099)**	**($1.118)**	**(15,467)**
High Case	($5.392)	($2.549)	($1.358)	(18,788)

Note: Based on The Perryman Group's estimates of incremental direct costs for insurance by industry if caps on noneconomic damages are removed, the resulting reductions in productive activity and consumer spending, and related multiplier effects. Additional definitions of terms and explanation of methods and assumptions may be found elsewhere in this report and in Appendix A. Results by industry are included in Appendix B.
Source: US Multi-Regional Impact Assessment System, The Perryman Group

These losses represent a reduction in economic output (gross product) due to additional civil justice costs of **$357** per person in Colorado (or **$921** per household) under the baseline case. This amount is in addition to the estimated costs of excessive litigation in the state that were previously described.

Fiscal Effects

Business activity generates tax revenue. The economic losses which could be expected with the elimination of caps on noneconomic damages would decrease tax receipts to the State and local government entities including counties, cities, and schools. Tax effects were estimated based on the decrease in economic activity quantified by The Perryman Group and described in the preceding sections.

For example, retail sales decrease as a result of the economic effects measured in this study (results appear in Appendix B). A portion of these retail sales would be taxable, leading to decreased receipts to the State and local taxing entities. Similarly, reduced earnings result in lower income tax collections.

The Perryman Group estimates that the potential annual decrease in tax receipts would include approximately $101.9 million to the State of Colorado and almost $78.3 million to local government entities across the state in the baseline case.

Economic activity also affects property tax values. Lower incomes associated with the economic losses would decrease housing demand, leading to lower taxable values as well as a decreased need for houses. In addition, decreased retail sales and incomes negatively affect the need for commercial space such as restaurants, retail outlets, and personal service facilities. Lower property values decrease related taxes.

When the total economic effects are considered (such as those measured in this study), the tax losses from these sources are significant. The Perryman Group estimates that the potential annual decrease in tax receipts would include approximately **$101.9 million** to the State of Colorado and almost **$78.3 million** to local government entities across the state in the baseline case.

Projected Annual Tax Revenue Losses Associated with Removing Caps on Noneconomic Damages (in Millions)		
	State	**Local**
Low Case	($82.287)	($63.218)
Baseline	**($101.891)**	**($78.279)**
High Case	($123.768)	($95.087)

Note: Based on economic impacts measured in this study.
Source: The Perryman Group

Potential Impact on Economic Development

The Perryman Group has extensive experience in the area of economic development and has studied the relationship between the civil justice system and economic growth in a variety of contexts including access, supply and compensation of judicial personnel, adequate court records, and numerous types of judicial reforms. A balanced civil justice system is an important aspect of fundamental economic health and development, which involves much of what state government does on an ongoing basis.

Economic development hinges on an environment conducive to doing business, and an unbalanced civil justice system can be a deterrent.

Economic development hinges on an environment conducive to doing business, and an unbalanced civil justice system can be a deterrent. Areas where awards are unpredictable and insurance costs are higher, for example, can be less attractive for business investment and, hence, economic growth.

Basic factors such as workforce availability, infrastructure, regulatory environment, cost structure, and proximity to customers are essential elements of economic development. However, initiatives such as the one under consideration in Colorado which removes caps on noneconomic damages can make the state less competitive and, thus, also play a role in the state's ability to attract desirable corporate locations and expansions.

Conclusion

A properly functioning civil justice system is essential to long-term economic growth, opportunity, and competitiveness. Without caps on noneconomic damages, there is the potential for excessive verdicts which lead to increased costs of insurance, diversion of scarce societal resources, and economic costs which ultimately affect individuals, businesses, and overall growth prospects.

Removing caps on noneconomic damages could cost the Colorado economy between $1.7 and $2.5 billion in annual gross product and 12,500 to 18,800 jobs.

The Perryman Group estimates that when multiplier effects are considered, removing caps on noneconomic damages could cost the Colorado economy between **$1.7 and $2.5 billion** in annual gross product and **12,500 to 18,800** jobs.

The costs to the Colorado economy of removing caps on noneconomic damages are substantial. The Perryman Group estimates that removing the caps would impose **losses due to additional civil justice costs of approximately $357 per Colorado resident annually**. In summary, increasing litigation risk in a manner that leads to random and uncertain outcomes and increases the costs of doing business will impose substantial short-term and long-term harms to Colorado and its citizens.

Appendix A: Methods Used

US Multi-Regional Impact Assessment System

Overview

The US Multi-Regional Impact Assessment System (USMRIAS) measures multiplier effects of economic stimuli. The USMRIAS was developed and is maintained by The Perryman Group. This model has been used in hundreds of diverse applications across the country and has an excellent reputation for accuracy and credibility; it has also been peer reviewed on multiple occasions and has been a key factor in major national and international policy simulations.

The basic modeling technique is known as dynamic input-output analysis, which essentially uses extensive survey data, industry information, and a variety of corroborative source materials to create a matrix describing the various goods and services (known as resources or inputs) required to produce one unit (a dollar's worth) of output for a given sector. Once the base information is compiled, it can be mathematically simulated to generate evaluations of the magnitude of successive rounds of activity involved in the overall production process.

There are two essential steps in conducting an input-output analysis once the system is operational. The first major endeavor is to accurately define the levels of direct activity to be evaluated. This process was described within the report.

The estimated direct effects were then used in a simulation of the input-output system to measure total overall economic effects (not only direct, but also indirect and induced). The system used reflects the unique industrial structure of the Colorado economy.

Model Structure

The USMRIAS is somewhat similar in format to the Input-Output Model of the United States which is maintained by the US Department of Commerce. The model developed by TPG, however, incorporates several important enhancements and refinements. Specifically, the expanded system includes (1) comprehensive 500-sector coverage for any county, multi-county, or urban region; (2) calculation of both total expenditures and value-added by industry and region; (3) direct estimation of expenditures for multiple basic input choices (expenditures, output, income, or employment); (4) extensive parameter localization; (5) price

adjustments for real and nominal assessments by sectors and areas; (6) comprehensive measurement of the induced impacts associated with payrolls and consumer spending; (7) embedded modules to estimate multi-sectoral direct spending effects; (8) estimation of retail spending activity by consumers; and (9) comprehensive linkage and integration capabilities with a wide variety of econometric, real estate, occupational, and fiscal impact models.

The impact assessment (input-output) process essentially estimates the amounts of all types of goods and services required to produce one unit (a dollar's worth) of a specific type of output. For purposes of illustrating the nature of the system, it is useful to think of inputs and outputs in dollar (rather than physical) terms. As an example, the construction of a new building will require specific dollar amounts of lumber, glass, concrete, hand tools, architectural services, interior design services, paint, plumbing, and numerous other elements. Each of these suppliers must, in turn, purchase additional dollar amounts of inputs. This process continues through multiple rounds of production, thus generating subsequent increments to business activity. The initial process of building the facility is known as the *direct effect*. The ensuing transactions in the output chain constitute the *indirect effect*.

Another pattern that arises in response to any direct economic activity comes from the payroll dollars received by employees at each stage of the production cycle. As workers are compensated, they use some of their income for taxes, savings, and purchases from external markets. A substantial portion, however, is spent locally on food, clothing, health care services, utilities, housing, recreation, and other items. Typical purchasing patterns in the relevant areas are obtained from the Center for Community and Economic Research *Cost of Living Index*, a privately compiled inter-regional measure which has been widely used for several decades, and the *Consumer Expenditure Survey* of the US Department of Labor. These initial outlays by area residents generate further secondary activity as local providers acquire inputs to meet this consumer demand. These consumer spending impacts are known as the *induced effect*. The USMRIAS is designed to provide realistic, yet conservative, estimates of these phenomena.

Sources for information used in this process include the Bureau of the Census, the Bureau of Labor Statistics, the Regional Economic Information System of the US Department of Commerce, and other public and private sources. The pricing data are compiled from the US Department of Labor and the US Department of Commerce. The verification and testing procedures make use of extensive public and private sources.

Impacts are typically measured in constant dollars to eliminate the effects of inflation.

The USMRIAS is also integrated with a comprehensive fiscal model, which links the tax payments by industry to the specific rates and structures associated with the relevant State and local governmental authorities.

Measures of Business Activity

The USMRIAS generates estimates of total economic effects on several measures of business activity. Note that these are different ways of measuring the same impacts; they are not additive.

The most comprehensive measure of economic activity is **Total Expenditures**. This measure incorporates every dollar that changes hands in any transaction. For example, suppose a farmer sells wheat to a miller for $0.50; the miller then sells flour to a baker for $0.75; the baker, in turn, sells bread to a customer for $1.25. The Total Expenditures recorded in this instance would be $2.50, that is, $0.50 + $0.75 + $1.25. This measure is quite broad but is useful in that (1) it reflects the overall interplay of all industries in the economy, and (2) some key fiscal variables such as sales taxes are linked to aggregate spending.

A second measure of business activity is **Gross Product**. This indicator represents the regional equivalent of Gross Domestic Product, the most commonly reported statistic regarding national economic performance. In other words, the Gross Product of Texas is the amount of US output that is produced in that state; it is defined as the value of all final goods produced in a given region for a specific period of time. Stated differently, it captures the amount of value-added (gross area product) over intermediate goods and services at each stage of the production process, that is, it eliminates the double counting in the Total Expenditures concept. Using the example above, the Gross Product is $1.25 (the value of the bread) rather than $2.50. Alternatively, it may be viewed as the sum of the value-added by the farmer, $0.50; the miller, $0.25 ($0.75 - $0.50); and the baker, $0.50 ($1.25 - $0.75). The total value-added is, therefore, $1.25, which is equivalent to the final value of the bread. In many industries, the primary component of value-added is the wage and salary payments to employees.

The third gauge of economic activity used in this evaluation is **Personal Income**. As the name implies, Personal Income is simply the income received by individuals, whether in the form of wages, salaries, interest, dividends, proprietors' profits, or other sources. It may thus be viewed as the segment of overall impacts which flows directly to the citizenry.

The final aggregates used are **Jobs and Job-Years,** which reflect the full-time equivalent jobs generated by an activity. For an economic stimulus expected to

endure (such as the ongoing operations of a facility), the Jobs measure is used. It should be noted that, unlike the dollar values described above, Jobs is a "stock" rather than a "flow." In other words, if an area produces $1 million in output in 2022 and $1 million in 2023, it is appropriate to say that $2 million was achieved in the 2022-23 period. If the same area has 100 people working in 2022 and 100 in 2023, it only has 100 Jobs. When a flow of jobs is measured, such as in a construction project or a cumulative assessment over multiple years, it is appropriate to measure employment in Job-Years (a person working for a year, though it could be multiple individuals working for partial years). This concept is distinct from Jobs, which anticipates that the relevant positions will be maintained on a continuing basis.

US Multi-Regional Econometric Model

Overview

The US Multi-Regional Econometric Model was developed by Dr. M. Ray Perryman, President and CEO of The Perryman Group (TPG), about 40 years ago and has been consistently maintained, expanded, and updated since that time. It is formulated in an internally consistent manner and is designed to permit the integration of relevant global, national, state, and local factors into the projection process. It is the result of four decades of continuing research in econometrics, economic theory, statistical methods, and key policy issues and behavioral patterns, as well as intensive, ongoing study of all aspects of the global, US, state, and metropolitan area economies. It is extensively used by scores of federal and State governmental entities on an ongoing basis, as well as hundreds of major corporations. It can be integrated with The Perryman Group's other models and systems to provide dynamic projections.

This section describes the forecasting process in a comprehensive manner, focusing on both the modeling and the supplemental analysis. The overall methodology, while certainly not ensuring perfect foresight, permits an enormous body of relevant information to impact the economic outlook in a systematic manner.

Model Logic and Structure

The Model revolves around a core system which projects output (real and nominal), income (real and nominal), and employment by industry in a

simultaneous manner. For the purposes of illustration, it is useful to initially consider the employment functions. Essentially, employment within the system is a derived demand relationship obtained from a neo-Classical production function. The expressions are augmented to include dynamic temporal adjustments to changes in relative factor input costs, output and (implicitly) productivity, and technological progress over time. Thus, the typical equation includes output, the relative real cost of labor and capital, dynamic lag structures, and a technological adjustment parameter. The functional form is logarithmic, thus preserving the theoretical consistency with the neo-Classical formulation.

The income segment of the model is divided into wage and non-wage components. The wage equations, like their employment counterparts, are individually estimated at the 3-digit North American Industry Classification System (NAICS) level of aggregation. Hence, income by place of work is measured for approximately 90 production categories. The wage equations measure real compensation, with the form of the variable structure differing between "basic" and "non-basic."

The basic industries, comprised primarily of the various components of Mining, Agriculture, and Manufacturing, are export-oriented, i.e., they bring external dollars into the area and form the core of the economy. The production of these sectors typically flows into national and international markets; hence, the labor markets are influenced by conditions in areas beyond the borders of the particular region. Thus, real (inflation-adjusted) wages in the basic industry are expressed as a function of the corresponding national rates, as well as measures of local labor market conditions (the reciprocal of the unemployment rate), dynamic adjustment parameters, and ongoing trends.

The "non-basic" sectors are somewhat different in nature, as the strength of their labor markets is linked to the health of the local export sectors. Consequently, wages in these industries are related to those in the basic segment of the economy. The relationship also includes the local labor market measures contained in the basic wage equations.

Note that compensation rates in the export or "basic" sectors provide a key element of the interaction of the regional economies with national and international market phenomena, while the "non-basic" or local industries are strongly impacted by area production levels. Given the wage and employment equations, multiplicative identities in each industry provide expressions for total compensation; these totals may then be aggregated to determine aggregate wage

and salary income. Simple linkage equations are then estimated for the calculation of personal income by place of work.

The non-labor aspects of personal income are modeled at the regional level using straightforward empirical expressions relating to national performance, dynamic responses, and evolving temporal patterns. In some instances (such as dividends, rents, and others) national variables (for example, interest rates) directly enter the forecasting system. These factors have numerous other implicit linkages into the system resulting from their simultaneous interaction with other phenomena in national and international markets which are explicitly included in various expressions.

The output or gross area product expressions are also developed at the 3-digit NAICS level. Regional output for basic industries is linked to national performance in the relevant industries, local and national production in key related sectors, relative area and national labor costs in the industry, dynamic adjustment parameters, and ongoing changes in industrial interrelationships (driven by technological changes in production processes).

Output in the non-basic sectors is modeled as a function of basic production levels, output in related local support industries (if applicable), dynamic temporal adjustments, and ongoing patterns. The inter-industry linkages are obtained from the input-output (impact assessment) system which is part of the overall integrated modeling structure maintained by The Perryman Group. Note that the dominant component of the econometric system involves the simultaneous estimation and projection of output (real and nominal), income (real and nominal), and employment at a disaggregated industrial level. This process, of necessity, also produces projections of regional price deflators by industry. These values are affected by both national pricing patterns and local cost variations and permit changes in prices to impact other aspects of economic behavior. Income is converted from real to nominal terms using relevant Consumer Price Indices, which fluctuate in response to national pricing patterns and unique local phenomena.

Several other components of the model are critical to the forecasting process. The demographic module includes (1) a linkage equation between wage and salary (establishment) employment and household employment, (2) a labor force participation rate function, and (3) a complete population system with endogenous migration. Given household employment, labor force participation (which is a function of economic conditions and evolving patterns of worker

preferences), and the working-age population, the unemployment rate and level become identities.

The population system uses Census information, fertility rates, and life tables to determine the "natural" changes in population by age group. Migration, the most difficult segment of population dynamics to track, is estimated in relation to relative regional and extra-regional economic conditions over time. Because evolving economic conditions determine migration in the system, population changes are allowed to interact simultaneously with overall economic conditions. Through this process, migration is treated as endogenous to the system, thus allowing population to vary in accordance with relative business performance (particularly employment).

Real retail sales is related to income, interest rates, dynamic adjustments, and patterns in consumer behavior on a store group basis. It is expressed on an inflation-adjusted basis. Inflation at the state level relates to national patterns, indicators of relative economic conditions, and ongoing trends. As noted earlier, prices are endogenous to the system.

A final significant segment of the forecasting system relates to real estate absorption and activity. The short-term demand for various types of property is determined by underlying economic and demographic factors, with short-term adjustments to reflect the current status of the pertinent building cycle. In some instances, this portion of the forecast requires integration with the US Multi-Regional Industry-Occupation System which is maintained by The Perryman Group. This system also allows any employment simulation or forecast from the econometric model to be translated into a highly detailed occupational profile.

The overall US Multi-Regional Econometric Model contains numerous additional specifications, and individual expressions are modified to reflect alternative lag structures, empirical properties of the estimates, simulation requirements, and similar phenomena. Moreover, it is updated on an ongoing basis as new data releases become available. Nonetheless, the above synopsis offers a basic understanding of the overall structure and underlying logic of the system.

Model Simulation and Multi-Regional Structure

The initial phase of the simulation process is the execution of a standard non-linear algorithm for the state system and that of each of the individual sub-areas. The external assumptions are derived from scenarios developed through national and international models and extensive analysis by The Perryman Group.

Once the initial simulations are completed, they are merged into a single system with additive constraints and interregional flows. Using information on minimum regional requirements, import needs, export potential, and locations, it becomes possible to balance the various forecasts into a mathematically consistent set of results. This process is, in effect, a disciplining exercise with regard to the individual regional (including metropolitan and rural) systems. By compelling equilibrium across all regions and sectors, the algorithm ensures that the patterns in state activity are reasonable in light of smaller area dynamics and, conversely, that the regional outlooks are within plausible performance levels for the state as a whole.

The iterative simulation process has the additional property of imposing a global convergence criterion across the entire multi-regional system, with balance being achieved simultaneously on both a sectoral and a geographic basis. This approach is particularly critical on non-linear dynamic systems, as independent simulations of individual systems often yield unstable, non-convergent outcomes.

It should be noted that the underlying data for the modeling and simulation process are frequently updated and revised by the various public and private entities compiling them. Whenever those modifications to the database occur, they bring corresponding changes to the structural parameter estimates of the various systems and the solutions to the simulation and forecasting system. The multi-regional version of the econometric model is re-estimated and simulated with each such data release, thus providing a constantly evolving and current assessment of state and local business activity.

The Final Forecast

The process described above is followed to produce an initial set of projections. Through the comprehensive multi-regional modeling and simulation process, a systematic analysis is generated which accounts for both historical patterns in economic performance and inter-relationships and the best available information on the future course of pertinent external factors. While the best available techniques and data are employed in this effort, they are not capable of directly capturing “street sense,” i.e., the contemporaneous and often non-quantifiable information that can materially affect economic outcomes. In order to provide a comprehensive approach to the prediction of business conditions, it is necessary to compile and assimilate extensive material regarding current events and other relevant factors.

This critical aspect of the forecasting methodology includes activities such as (1) daily review of hundreds of financial and business publications and electronic information sites; (2) review of major newspapers and online news sources in the state on a daily basis; (3) dozens of hours of direct telephone interviews with key business and political leaders in all parts of the state; (4) face-to-face discussions with representatives of major industry groups; and (5) frequent site visits to the various regions of the state. The insights arising from this "fact finding" are analyzed and evaluated for their effects on the likely course of the future activity.

Another vital information resource stems from the firm's ongoing interaction with key players in the international, domestic, and state economic scenes. Such activities include visiting with corporate groups on a regular basis and being regularly involved in the policy process at all levels. The firm is also an active participant in many major corporate relocations, economic development initiatives, and regulatory proceedings.

Once organized, this information is carefully assessed and, when appropriate, independently verified. The impact on specific communities and sectors that is distinct from what is captured by the econometric system is then factored into the forecast analysis. For example, the opening or closing of a major facility, particularly in a relatively small area, can cause a sudden change in business performance that will not be accounted for by either a modeling system based on historical relationships or expected (primarily national and international) factors.

The final step in the forecasting process is the integration of this material into the results in a logical and mathematically consistent manner. In some instances, this task is accomplished through "constant adjustment factors" which augment relevant equations. In other cases, anticipated changes in industrial structure or regulatory parameters are initially simulated within the context of the Multi-Regional Impact Assessment System to estimate their ultimate effects by sector. Those findings are then factored into the simulation as constant adjustments on a distributed temporal basis. Once this scenario is formulated, the extended system is again balanced across regions and sectors through an iterative simulation algorithm analogous to that described in the preceding section.

Appendix B: Detailed Results

The Potential Impact of Removing Caps on Noneconomic Damages on Business Activity in Colorado: Baseline Case

Results by Industry

Industry	Total Expenditures	Gross Product	Personal Income	Jobs
Agriculture	-$81.0 m	-$23.5 m	-$15.7 m	-199
Mining	-$96.3 m	-$23.2 m	-$12.3 m	-59
Utilities	-$180.3 m	-$40.7 m	-$17.8 m	-60
Construction	-$161.0 m	-$79.4 m	-$65.4 m	-748
Manufacturing	-$564.3 m	-$174.0 m	-$98.7 m	-1,197
Wholesale Trade	-$188.4 m	-$127.5 m	-$73.5 m	-677
Retail Trade*	-$492.0 m	-$368.0 m	-$213.8 m	-5,361
Transportation & Warehousing	-$138.2 m	-$92.9 m	-$61.5 m	-681
Information	-$122.0 m	-$75.5 m	-$32.2 m	-232
Financial Activities*	-$1,717.1 m	-$662.6 m	-$173.7 m	-1,421
Business Services	-$275.8 m	-$181.2 m	-$147.8 m	-1,463
Health Services	-$174.9 m	-$120.5 m	-$101.9 m	-1,371
Other Services	-$247.4 m	-$129.8 m	-$103.4 m	-1,998
Total, All Industries	**-$4,438.7 m**	**-$2,098.8 m**	**-$1,117.7 m**	**-15,467**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in millions of 2023 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Potential Impact of Removing Caps on Noneconomic Damages on Business Activity in Colorado: Low Case

Results by Industry

Industry	Total Expenditures	Gross Product	Personal Income	Jobs
Agriculture	-$65.4 m	-$19.0 m	-$12.7 m	-161
Mining	-$77.7 m	-$18.7 m	-$10.0 m	-48
Utilities	-$145.6 m	-$32.9 m	-$14.3 m	-49
Construction	-$130.1 m	-$64.1 m	-$52.8 m	-604
Manufacturing	-$455.7 m	-$140.5 m	-$79.7 m	-966
Wholesale Trade	-$152.2 m	-$102.9 m	-$59.4 m	-547
Retail Trade*	-$397.3 m	-$297.2 m	-$172.7 m	-4,330
Transportation & Warehousing	-$111.6 m	-$75.0 m	-$49.6 m	-550
Information	-$98.5 m	-$61.0 m	-$26.0 m	-188
Financial Activities*	-$1,386.8 m	-$535.1 m	-$140.3 m	-1,147
Business Services	-$222.8 m	-$146.3 m	-$119.4 m	-1,182
Health Services	-$141.2 m	-$97.3 m	-$82.3 m	-1,107
Other Services	-$199.8 m	-$104.8 m	-$83.5 m	-1,613
Total, All Industries	**-$3,584.7 m**	**-$1,695.0 m**	**-$902.7 m**	**-12,491**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in millions of 2023 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.

The Potential Impact of Removing Caps on Noneconomic Damages on Business Activity in Colorado: High Case

Results by Industry

Industry	Total Expenditures	Gross Product	Personal Income	Jobs
Agriculture	-$98.4 m	-$28.5 m	-$19.0 m	-242
Mining	-$116.9 m	-$28.1 m	-$15.0 m	-72
Utilities	-$219.0 m	-$49.4 m	-$21.6 m	-73
Construction	-$195.6 m	-$96.5 m	-$79.5 m	-908
Manufacturing	-$685.5 m	-$211.3 m	-$119.9 m	-1,454
Wholesale Trade	-$228.9 m	-$154.8 m	-$89.3 m	-823
Retail Trade*	-$597.6 m	-$447.1 m	-$259.7 m	-6,512
Transportation & Warehousing	-$167.8 m	-$112.9 m	-$74.7 m	-827
Information	-$148.2 m	-$91.7 m	-$39.1 m	-282
Financial Activities*	-$2,085.8 m	-$804.9 m	-$211.0 m	-1,726
Business Services	-$335.1 m	-$220.1 m	-$179.5 m	-1,778
Health Services	-$212.4 m	-$146.4 m	-$123.8 m	-1,665
Other Services	-$300.5 m	-$157.7 m	-$125.6 m	-2,426
Total, All Industries	**-$5,391.7 m**	**-$2,549.4 m**	**-$1,357.7 m**	**-18,788**

Source: US Multi-Regional Impact Assessment System, The Perryman Group
Notes: Monetary values given in millions of 2023 US dollars per year. Components may not sum due to rounding. Retail Trade includes Restaurants, Financial Activities includes Real Estate.