Case No. 2024-1556

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

MID CONTINENT STEEL & WIRE, INC.,

Plaintiff-Appellee

v.

UNITED STATES,

Defendant-Appellee,

and

PT ENTERPRISE INC., PRO-TEAM COIL NAIL ENTERPRISE INC., UNICATCH INDUSTRIAL CO., LTD., WTA INTERNATIONAL CO., LTD., ZON MON CO., LTD., HOR LIANG INDUSTRIAL CORPORATION, PRESIDENT INDUSTRIAL INC., LIANG CHYUAN INDUSTRIAL CO., LTD.

Defendants-Appellants

On Appeal from the United States Court of International Trade
in Court Nos. 1:15-cv-00213-CRK and 1:15-cv-00220-CRK, Judge Claire R. Kelly

BRIEF OF THE GOVERNMENT OF CANADA; CANFOR CORPORATION; CANADIAN FOREST PRODUCTS, LTD.; CANFOR WOOD PRODUCTS MARKETING, LTD.; J.D. IRVING, LIMITED; RESOLUTE FP CANADA INC.; TOLKO INDUSTRIES LTD.; TOLKO MARKETING AND SALES LTD.; AND WEST FRASER MILLS LTD. AS *AMICI CURIAE* IN SUPPORT OF DEFENDANTS-APPELLANTS AND URGING REVERSAL

May 28, 2024

(Counsel listed on next page)

R. Will Planert
Julie C. Mendoza
Donald B. Cameron
Brady W. Mills
Mary S. Hodgins
Nicholas C. Duffey
MORRIS, MANNING & MARTIN LLP
1333 New Hampshire Ave., NW
Suite 800
Washington, D.C. 20036
(202) 216-4819
wplanert@mmmlaw.com
Counsel to Canfor Corporation, Canadian Forest Products, Ltd., and Canfor Wood Products Marketing, Ltd.

Eric S. Parnes
Joanne E. Osendarp
Alan G. Kashdan
Tyler J. Kimberly
BLANK ROME LLP
1825 Eye Street, NW
Washington, D.C. 20006
(202) 420-5479
eric.parnes@blankrome.com
Counsel to the Government of Canada

Jay C. Campbell
WHITE & CASE LLP
701 Thirteenth Street, NW
Washington, D.C. 20005
(202) 626-3600
jcampbell@whitecase.com
Counsel to J.D. Irving, Limited

Elliot J. Feldman
Michael S. Snarr
Tung A. Nguyen
BAKER HOSTETLER LLP
1050 Connecticut Ave NW
Eleventh Floor
Washington, D.C. 20036
(202) 861-1679
efeldman@bakerlaw.com
Counsel to Resolute FP Canada Inc.

Henry D. Almond
Kang Woo Lee
ARNOLD & PORTER KAYE SCHOLER LLP
601 Massachusetts Ave., NW
Washington, D.C. 20001
(202) 942-5000
henry.almond@arnoldporter.com
Counsel to Tolko Industries Ltd. and Tolko Marketing and Sales Ltd.

Donald Harrison
GIBSON, DUNN & CRUTCHER LLP
1050 Connecticut Ave., NW
Washington, D.C. 20036
(202) 955-8500
DHarrison@gibsondunn.com
Counsel to West Fraser Mills Ltd.

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

CERTIFICATE OF INTEREST

Case Number 2024-1556

Short Case Caption Mid Continent Steel & Wire, Inc. v. United States

Filing Party/Entity Government of Canada

Instructions:

1. Complete each section of the form and select none or N/A if appropriate.
2. Please enter only one item per box; attach additional pages as needed, and check the box to indicate such pages are attached.
3. In answering Sections 2 and 3, be specific as to which represented entities the answers apply; lack of specificity may result in non-compliance.
4. Please do not duplicate entries within Section 5.
5. Counsel must file an amended Certificate of Interest within seven days after any information on this form changes. Fed. Cir. R. 47.4(c).

I certify the following information and any attached sheets are accurate and complete to the best of my knowledge.

Date: 05/28/2024

Signature: /s/ Eric S. Parnes

Name: Eric S. Parnes

1. Represented Entities. Fed. Cir. R. 47.4(a)(1).	**2. Real Party in Interest.** Fed. Cir. R. 47.4(a)(2).	**3. Parent Corporations and Stockholders.** Fed. Cir. R. 47.4(a)(3).
Provide the full names of all entities represented by undersigned counsel in this case.	Provide the full names of all real parties in interest for the entities. Do not list the real parties if they are the same as the entities. ☑ None/Not Applicable	Provide the full names of all parent corporations for the entities and all publicly held companies that own 10% or more stock in the entities. ☑ None/Not Applicable
Government of Canada		

☐ Additional pages attached

4. Legal Representatives. List all law firms, partners, and associates that (a) appeared for the entities in the originating court or agency or (b) are expected to appear in this court for the entities. Do not include those who have already entered an appearance in this court. Fed. Cir. R. 47.4(a)(4).

☑ None/Not Applicable ☐ Additional pages attached

5. Related Cases. Other than the originating case(s) for this case, are there related or prior cases that meet the criteria under Fed. Cir. R. 47.5(a)?

☐ Yes (file separate notice; see below) ☐ No ☑ N/A (amicus/movant)

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6. Organizational Victims and Bankruptcy Cases. Provide any information required under Fed. R. App. P. 26.1(b) (organizational victims in criminal cases) and 26.1(c) (bankruptcy case debtors and trustees). Fed. Cir. R. 47.4(a)(6).

☑ None/Not Applicable ☐ Additional pages attached

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

CERTIFICATE OF INTEREST

Case Number 2024-1556

Short Case Caption Mid Continent Steel & Wire, Inc. v. US

Filing Party/Entity Canfor Corporation, Canadian Forest Products, Ltd., and Canfor Wood Products Marketing, Ltd.

Instructions:

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Date: 05/28/2024

Signature: /s/ R. Will Planert

Name: R. Will Planert

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Canfor Corporation		None/Not Applicable
Canadian Forest Products, Ltd.		Canfor Corporation is a publicly traded company that owns 10% or more of Canadian Forest Products, Ltd.
Canfor Wood Products Marketing, Ltd.		Canadian Forest Products, Ltd. is a parent corporation of Canadian Wood Products Marketing, Ltd.

☐ Additional pages attached

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☐ None/Not Applicable ☐ Additional pages attached

Morris, Manning & Martin, LLP	Jordan L. Fleischer	Eugene Degnan
Ryan R. Migeed		

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UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

CERTIFICATE OF INTEREST

Case Number 2024-1556

Short Case Caption Mid Continent Steel & Wire, Inc. v. United States

Filing Party/Entity J.D. Irving, Limited

Instructions:

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Date: 05/28/2024

Signature: /s/ Jay C. Campbell

Name: Jay C. Campbell

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J.D. Irving, Limited	N/A	J.K. Irving, Limited

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UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

CERTIFICATE OF INTEREST

Case Number 2024-1556

Short Case Caption MID CONTINENT STEEL & WIRE, INC. v. UNITED STATES

Filing Party/Entity Resolute FP Canada Inc.

Instructions:

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Date: 05/28/2024

Signature: /s/ Elliot J. Feldman

Name: Elliot J. Feldman

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Resolute FP Canada Inc.		Resolute Forest Products Inc.

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UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

CERTIFICATE OF INTEREST

Case Number 2024-1556

Short Case Caption Mid Continent Steel & Wire, Inc. v. United States

Filing Party/Entity Tolko Industries Ltd. and Tolko Marketing and Sales Ltd.

Instructions:

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Date: 05/28/2024

Signature: /s/ Henry D. Almond

Name: Henry D. Almond

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Tolko Industries Ltd.		None/Not Applicable
Tolko Marketing and Sales Ltd.		Tolko Industries Ltd.

☐ Additional pages attached

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UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

CERTIFICATE OF INTEREST

Case Number 2024-1556

Short Case Caption Mid Continent Steel & Wire, Inc. v. United States

Filing Party/Entity West Fraser Mills Ltd.

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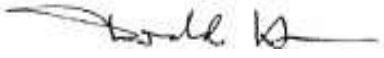
Date: 05/28/2024

Signature: 

Name: Donald Harrison

1. Represented Entities. Fed. Cir. R. 47.4(a)(1).	**2. Real Party in Interest.** Fed. Cir. R. 47.4(a)(2).	**3. Parent Corporations and Stockholders.** Fed. Cir. R. 47.4(a)(3).
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West Fraser Mills Ltd.		West Fraser Timber Co. Ltd.

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☑ None/Not Applicable ☐ Additional pages attached

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INTEREST OF *AMICI CURIAE*[1]

Amicus curiae[2] the Government of Canada ("Canada") is a signatory to the United States-Mexico-Canada Agreement ("USMCA"), a party to the WTO Anti-Dumping Agreement, and one of the United States' largest trading partners. Canada has a broad interest in the fidelity and predictability of the application of U.S. antidumping law by the U.S. Department of Commerce ("Commerce"). Imports from Canada are subject to antidumping duties in a number of cases. Those cases include antidumping investigations and administrative reviews with respect to softwood lumber from Canada,[3] which are part of one of the largest and longest-running trade disputes in the world. *Amici curiae* Canfor Corporation;

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[1] PT Enterprise Inc., Pro-Team Coil Nail Enterprise Inc., Unicatch Industrial Co., Ltd., WTA International Co., Ltd., Zon Mon Co., Ltd., Hor Liang Industrial Corporation, President Industrial Inc., and Liang Chyuan Industrial Co., Ltd., have consented to the filing of this *amicus* brief. Plaintiff-Appellee Mid Continent Steel and Wire, Inc. and Defendant-Appellee the United States do not oppose the filing of this *amicus* brief.

[2] No counsel for a party authored this brief in whole or in part. No party or a party's counsel contributed money that was intended to fund preparing or submitting this brief. No person other than *amici* or its counsel has contributed money that was intended to fund preparing or submitting this brief.

[3] *See, e.g.*, *Certain Softwood Lumber Products From Canada: Final Affirmative Determination of Sales at Less Than Fair Value and Affirmative Final Determination of Critical Circumstances*, 82 Fed. Reg. 51,806 (Dep't Commerce Nov. 8, 2017); *Certain Softwood Lumber Products From Canada: Final Results and Final Rescission, in Part, of the Countervailing Duty Administrative Review; 2021*, 88 Fed. Reg. 50,103 (Dep't Commerce Aug. 1, 2023).

Canadian Forest Products, Ltd.; Canfor Wood Products Marketing, Ltd.; J.D. Irving, Limited; Resolute FP Canada Inc.; Tolko Industries Ltd.; Tolko Marketing and Sales Ltd.; and West Fraser Mills Ltd. (collectively, the "Lumber Producers") are Canadian producers and exporters of softwood lumber that were respondents in Commerce's antidumping investigation concerning softwood lumber and are subject to the annual reviews through which Commerce sets both retrospective duties and prospective cash-deposit rates. The Cohen's *d* test at issue in this case and others pending before this Court[4] serves as the foundation for Commerce's differential pricing methodology ("DPM") and Commerce's identification of purported "targeted dumping" under that methodology. Commerce's imposition of antidumping duties applicable to *amici* Lumber Producers has been and continues to be driven to a significant degree by Commerce's application of its DPM, including through the miscalculation of the Cohen's *d* denominator.

Amici have thus dealt firsthand with Commerce's use of Cohen's *d* as part of its DPM and have extensively engaged with the underlying literature and statistical science. That engagement has included consultations with one of the world's leading experts in statistical methods and measurements of effect size, who has

[4] *See Stupp Corp. v. United States*, CAFC Case No. 23-1663; *Marmen Inc. v. United States*, CAFC Case No. 23-1877.

analyzed and opined on Commerce's departures from the statistical principles in which the agency purports to ground its methodology.[5] *Amici* have an interest in bringing those departures to light and assisting the Court in holding Commerce to its obligation to engage in reasoned and reasonable decision making.

Amici respectfully submit that the successful and lawful operation of the antidumping law for all interested parties depends on the integrity of Commerce's statistical tests, including Cohen's *d*. For this reason, *amici* have sought and obtained leave to participate as *amici* in challenges to other aspects of Commerce's use of Cohen's *d*.[6] *Amici* are also parties to direct challenges to Commerce's methodologies, including the methodology for calculating the Cohen's *d* denominator, before the U.S. Court of International Trade ("CIT"),[7] and before binational panels convened under the North American Free Trade Agreement and

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[5] Larry V. Hedges, *Review and Analysis of the Cohen's* d *Test as Used in the U.S. Department of Commerce's Differential Pricing Methodology* (Jan. 2, 2024), filed as Exh. 1 to Letter from Blank Rome LLP to U.S. Department of Commerce, Submission of Factual Information (Jan. 2, 2024) (*Certain Softwood Lumber Products From Canada; 2022* (A-122-857)).

[6] *E.g.*, *Stupp Corp. v. United States*, CAFC Case No. 23-1663 and *Marmen Inc. v. United States*, CAFC Case No. 23-1877. *Amici* in this case filed *amicus* briefs in these appeals challenging Commerce's use of Cohen's *d* when the data do not satisfy the assumptions of normality, equalize variances, and equal size.

[7] *Gov't of Canada v. United States*, CIT Consol. Ct. No. 23-00187-JCG; *Resolute FP Canada Inc. v. United States*, CIT Ct. No. 23-00095-JAR.

the USMCA.[8] The Court's holdings in this case may affect the outcomes of those challenges.

[8] *Certain Softwood Lumber Products From Canada: Final Results of Antidumping Duty Administrative Review and Final Determination of No Shipments; 2020*, USMCA No. USA-CDA-2022-10.12-02 (awaiting briefing); *Certain Softwood Lumber Products from Canada: Final Results of Antidumping Duty Administrative Review; 2019*, USMCA No. USA-CDA-2021-10.12-04 (in briefing); *Softwood Lumber from Canada, Final Results of the Antidumping Duty Administrative Review; 2017–2018,* USMCA No. USA-CDA-2020-10.12-02 (briefing complete, awaiting hearing); *Softwood Lumber from Canada: Final Affirmative Determination of Sales at Less Than Fair Value and Affirmative Final Determination of Critical Circumstances*, NAFTA No. USA-CDA-2017-1904-03 (remand redetermination filed with Panel).

INTRODUCTION AND SUMMARY OF ARGUMENT

To execute the statutory objective of determining whether U.S. prices differ significantly—the first and foundational step of Commerce's DPM[9]—Commerce relies on Cohen's *d*. Cohen's *d* is a measure of effect size, which, under certain conditions, can meaningfully express the differences between two groups of data as a "pure (unitless) number."[10] Cohen's *d* is sometimes referred to as a "standardized mean difference" because it expresses the difference in the means of two groups in standard terms.[11] The numerator of the *d* coefficient is the difference between the two groups' means, while the denominator, which provides the standardization, is the variance of the groups.[12] It is the denominator, therefore, that contextualizes the mean difference in "units of variability."[13] If Cohen's *d* is calculated without a denominator that consistently and accurately

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[9] *See Mid Continent Steel & Wire, Inc. v. United States* ("*Mid Continent V*"), 31 F.4th 1367, 1381 (Fed. Cir. 2022) (Appx984).

[10] Appx977.

[11] *See, e.g.*, Robert Coe, *It's the Effect Size Stupid: What Effect Size Is and Why It Is Important* at 6 (2002) ("*Coe*") (Appx1965).

[12] Consistent with the statistics literature, this brief refers to the group of data that isolates U.S. sales for a particular product by time period, customer, or region as the "test group" and the group of data composed of all other U.S. sales for the product as the "comparison group."

[13] Jacob Cohen, *Statistical Power Analysis for the Behavioral Sciences* at 21, 23 (2d ed. 1988) ("*Cohen*") (Appx1932, Appx1933).

standardizes the mean difference provided in the numerator, the resulting *d* coefficient does not provide useful information about the difference between the groups being compared.

While this brief focuses on Commerce's method for calculating the Cohen's *d* denominator, *amici* emphasize that Commerce's misapplication of Cohen's *d* is not limited to its calculation of the denominator.[14] Calculating and meaningfully interpreting Cohen's *d* also requires that the data satisfy the assumptions of normality, equal variances, and equal size.[15] By failing to account for these assumptions or, indeed, to recognize any conditions that its datasets must meet to be suitable for application of Cohen's *d*, Commerce severs any link between its calculation of *d* and the standardized calculations that allow *d* to function as a consistent measure of effect size. Although Commerce's use of Cohen's *d* when the data violate the assumptions is not directly at issue in this case, it is still relevant. If the data satisfied these assumptions, then the difficulties that Commerce faces in calculating the denominator to account for unequal variances and unequal size would not arise.

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[14] *See, e.g.*, *Stupp Corp. v. United States*, 5 F.4th 1341 (Fed. Cir. 2021).

[15] These issues are currently subject to the appeals in *Stupp Corp. v. United States*, CAFC Case No. 23-1663 and *Marmen Inc. v. United States*, CAFC Case No. 23-1877. *Amici* have filed *amicus* briefs in those cases explaining Commerce's misapplication of Cohen's *d* with respect to the assumptions.

Commerce calculates the denominator of the *d* coefficient by simple averaging.[16] Simple averaging takes the sum of the square of the test group's standard deviation and the square of the comparison group's standard deviation, and then divides the square root of that sum by two.[17] The statistics literature is clear that deriving the Cohen's *d* denominator by simple averaging is appropriate only if the test and comparison groups are equal in size.[18] Following several remands by this Court and the CIT, Commerce has accepted (under protest) that the literature does not support simple averaging when the groups being compared are of unequal size.[19]

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[16] *See generally* Appx977–Appx978; *Mid Continent Steel & Wire, Inc. v. United States* ("*Mid Continent VI*"), 628 F. Supp. 3d 1316, 1317 (Ct. Int'l Trade 2023) (Appx1721–Appx1722).

[17] Appx978.

[18] Appx983–Appx984; *Cohen* at 43–44 (Appx1943–Appx1944); Jean-Christophe Goulet-Pelletier & Denis Cousineau, *A Review of Effect Sizes and Their Confidence Intervals, Part I: The Cohen's d Family*, 14 The Quantitative Methods for Psychology, 242, 243 (2014) ("*Goulet-Pelletier & Cousineau*") (Appx2021–Appx2022).

[19] Appx2401–Appx2405 (describing the posture of this case); Appx249–Appx2410 (describing Commerce's disagreement with the courts' holdings). Based on the sets of transactions that Commerce compares when it applies Cohen's *d*—sales in one calendar quarter compared to all other calendar quarters, sales to one customer compared to sales to all other customers, and sales in one region compared to all other regions—the groups being compared will invariably be of unequal size.

Nevertheless, Commerce continues to simple average. In its latest remand determination in this case, Commerce has articulated a new rationale for persisting with this departure from statistical science. Commerce seizes on the literature's endorsement of simple averaging of standard deviations to calculate the Cohen's *d* denominator when comparing two groups of equal size.[20] Instead of acknowledging the straightforward arithmetical explanation for using a simple average when working with groups of equal size—a simple average for such groups is the same as a size-weighted average—Commerce makes the unsupported inferential leap that group size is actually a proxy for measuring "reliability."[21] Commerce avers that, rather than size-weighting each group's standard deviation, the literature endorses weighting each group's standard deviation based on its reliability.[22] In Commerce's view, any value, statistic, or parameter of a full population of data is 100% reliable, and, because each test and comparison group is a separate, full population of data, its standard deviation is 100% reliable.[23] According to Commerce, because each standard deviation of a population is

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[20] *See, e.g.*, Appx2410–Appx2413.

[21] Appx2411–Appx2412.

[22] *See* Appx2411–Appx2412.

[23] *See* Appx2412.

equally reliable (i.e., 100% reliable), each should be weighted equally regardless of relative size.[24]

Commerce acknowledges that the statistics literature does not connect reliability to the calculation of the Cohen's *d* denominator.[25] However, Commerce maintains that this Court allowed Commerce the option to depart from the statistics literature if the literature is not applicable to the issue under consideration.[26] According to Commerce, the statistics literature does not provide a solution for calculating the denominator of the *d* coefficient when using full populations of data.[27] Commerce makes this claim despite Cohen's explicit description of his formula for calculating the denominator as being applicable to "populations."[28] It is this purported gap in the literature that Commerce uses to justify its decision to "go beyond" the statistics literature.[29] Commerce does not, however, explain how

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[24] *See* Appx2412.

[25] *See, e.g.*, Appx2425 (explaining that its reliability explanation results when Commerce "follow{s} the logic to its conclusion"); Appx2461 (acknowledging that Commerce "must go beyond the academic literature" to support its reliability explanation).

[26] Appx2409; *see generally* Appx984.

[27] Appx2423.

[28] *Cohen* at 43 (Appx1943).

[29] Appx2423, Appx2425.

d coefficients calculated using a methodology that "go{es} beyond" the methodologies for calculating Cohen's *d* addressed in the literature can be presumed to carry the same meaning as the *d* coefficients described in the literature.[30]

Commerce also rejects this Court's observation that "when the entire population is known, the cited literature points toward using the standard deviation of the entire population as the denominator in Cohen's *d*."[31] According to Commerce, this "single standard deviation" method is not appropriate because this method "causes the denominator of the Cohen's *d* coefficient to reflect not just the dispersion of the data within each group, but also the dispersion of data between the two groups."[32] Commerce claims that a denominator calculated using this method is not suitable for Commerce's use of Cohen's *d*.[33]

As explained below, Commerce's explanations are unreasonable, internally inconsistent, and at odds with basic principles of statistics. We begin by explaining the purpose of the Cohen's *d* denominator and the different methods

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[30] Appx2423.

[31] Appx984.

[32] Appx2417.

[33] Appx2417–Appx2418.

suggested by the statistics literature for calculating it. We then unpack Commerce's rationale for defending its method of calculating the denominator and show that it lacks coherence and produces a *d* coefficient that differs from Cohen's *d*. Therefore, Commerce's *d* coefficient cannot be interpreted the same way as Cohen's *d* and is not grounded in the same literature and statistical science. Finally, we address Commerce's explanation for rejecting this Court's suggestion that Commerce could avoid conflict with the statistics literature (at least with respect to the denominator issue) by using the standard deviation for the full population of U.S. prices for a particular product being compared.

ARGUMENT

I. The Purpose of the Cohen's *d* Denominator and Methods for Its Calculation.

Cohen's *d* calculates the difference between the means of two groups of data using the following equations:

(2.2.1) $$\mathbf{d} = \frac{\mathbf{m_A - m_B}}{\boldsymbol{\sigma}}$$

for the directional (one-tailed) case, and

(2.2.2) $$\mathbf{d} = \frac{|\mathbf{m_A - m_B}|}{\boldsymbol{\sigma}}$$

for the nondirectional (two-tailed) case,
where **d** = ES index for **t** tests of means in standard unit,
$\mathbf{m_A}$, $\mathbf{m_B}$ = population means expressed in raw (original measurement) unit, and
σ = the standard deviation of either population (since they are assumed

equal).[34]

The Cohen's *d* coefficient takes the difference between two means (m_A, m_B) and expresses that difference in common, or standardized, units of variability.[35] When appropriately applied, Cohen's *d* provides consistent, meaningful information about how large the differences are between the values in two groups of data.[36] That no longer holds true, however, when the *d* coefficient is calculated using a non-standard denominator.

Ideally, the Cohen's *d* denominator is simply the "the standard deviation of the population from which the different treatment groups were taken."[37] If one has the full set of data from which the test and comparison groups were selected,[38] then one should use the standard deviation of that full set of data as the denominator.[39] The statistics literature acknowledges that researchers rarely have access to the

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[34] *Cohen* at 20 (Appx1932).

[35] *See id.* at 21 (Appx1932).

[36] *See id.* (Appx1932).

[37] *Coe* at 2 (Appx1961).

[38] The statistics literature often refers to this data set as the "population" or "full universe" of data. However, Commerce uses these terms to describe each of the test and comparison groups. To avoid confusion, this brief refers to the data set from which the test and comparison groups were selected as the "broader group."

[39] This issue is addressed in detail in Section III, *infra*.

broader group of data and cannot use its standard deviation as the denominator.[40] To address this reality, the statistics literature endorses alternative methods for calculating the Cohen's *d* denominator that yield consistent measures of effect size under specified conditions.[41] Below, we describe different methods for calculating Cohen's *d* denominator as set forth in the literature.

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[40] *Coe* at 2 (Appx1961); Paul D. Ellis, *The Essential Guide to Effect Sizes: Statistical Power, Meta-Analysis, and the Interpretation of Research Results* at 10 (2010) ("*Ellis*") (Appx1886); *Goulet-Pelletier & Cousineau* at 243 (Appx2022).

[41] *See Coe* at 2 (Appx1961) ("In practice, however, {the standard deviation of the population from which the different treatment groups were taken} is almost never known, so it must be estimated from either the standard deviation of the control group, or from a 'pooled' value from both groups . . . ."); *id.* at 6 (Appx19615); *Ellis* at 10 (Appx1886) ("If {the population standard deviation} is unknown, some approximate value must be used instead."); *Goulet-Pelletier & Cousineau* at 243 (Appx2022) (explaining that the first step in computing Cohen's *d* "is to choose the right divider . . . i.e., the value that best estimates the standard deviation of the population in a given design.").

Method 1: Calculating the Broader Group's (Population) Standard Deviation

Equation:[42]

$$\sigma = \sqrt{\frac{\sum(X-\mu)^2}{N}}$$

Where X is the value of an observation in the population, μ is the mean of the entire population, and N is the number of observations in the population.[43]

Explanation: The literature recommends using this method to calculate the denominator if possible.[44] At the same time, the statistics literature rarely discusses **Method 1**, presumably because researchers "almost never" have access to data for an entire population.[45]

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[42] Steven Wachs, *What Is a Standard Deviation and How Do I Compute It?* at 3 (2009) ("Wachs, *What Is a Standard Deviation*"); J.P. Guilford, *Fundamental Statistics in Psychology and Education* at 51–52 (1st ed. 1942); R.E. Deakin, D.G. Kildea, *A Note on Standard Deviation and RMS*, 44 The Australian Surveyor 74 (June 1999).

[43] Some of the statistics literature uses slightly different, but similar, variables to express the same equations and concepts discussed in this brief.

[44] *See* Appx984 ("Indeed, when the entire population is known, the cited literature points toward using the standard deviation of the entire population as the denominator in Cohen's *d*—which Commerce has not done."); *Goulet-Pelletier & Cousineau* at 243 (Appx2022).

[45] *Coe* at 2 (Appx1961).

Method 2: Simple Averaging the Standard Deviations of Groups of Equal Size (Cohen's Equation 2.3.2)

Equation:[46]

$$\sigma' = \sqrt{\frac{\sigma_A^2 + \sigma_B^2}{2}}$$

Where σ_A is the standard deviation of population A and σ_B is the standard deviation of population B.

Explanation: Cohen allows that, when the assumption of equal variances is violated to a minor extent (i.e., the standard deviations of the two groups differ slightly), the *d* coefficient may still be calculated to contextualize the difference between means in terms of the average of the standard deviations, as long as the assumption that the groups are of equal size holds.[47] If the assumption of equal size is also violated, then simple averaging may not be used to calculate the denominator of Cohen's *d* because the mean difference in the numerator will not be accurately scaled by the denominator.[48]

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[46] *See Cohen* at 44 (Appx1944) (equation 2.3.2).

[47] *See id.* at 43–44 (Appx1943–Appx1944) (defining the group sizes as equal for this scenario).

[48] *See id.* at 44 (Appx1944); Appx984 ("The cited literature nowhere suggest simple averaging for unequal-size groups.").

Method 3: Weight Averaging the Standard Deviations

Equation:[49]

$$SD^{*}_{pooled} = \sqrt{\frac{(n_A - 1)SD_A^2 + (n_B - 1)SD_B^2}{n_A + n_B - 2}}$$

Where n_A and n_B are the number of observations in groups A and B, respectively, and SD_A and SD_B are their standard deviations.

Explanation: When the standard deviations of the groups being compared differ and the groups are not of equal size, but one can assume that the groups (whether samples or subpopulations) were selected from the same population, there is support in the statistical literature for weight averaging the standard deviations.[50]

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[49] *Ellis* at 27 n.9 (Appx1903) (noting that this equation was described by Professor Hedges, and contains a small positive bias that can be corrected by using Hedges's *g*); Johnson Ching-Hong Li, *Effect size measures in a two-independent-samples case with nonnormal and nonhomogeneous data*, 48 Behavioral Research 1560, 1561 (2016); *see also Coe* at 6 (Appx1965–1966). Commerce asserts that Cohen's equation 2.5.2 is the appropriate equation to calculate a weight-averaged denominator. *Compare* Appx2416, *with Cohen* at 67 (Appx1955). However, equation 2.5.2 is not applicable to Commerce's use of Cohen's *d* because it is used to measure d_S, not *d*, and is calculated using experimental data to detect "the palpable characteristics of the sample and their bearing on the null hypothesis." *Cohen* at 66 (Appx1955); *see also* Appx1727 & n.13.

[50] *Coe* at 6 (Appx1965–Appx1966); *see also Ellis* at 27 n.9 (Appx1903).

Method 4: Commingled Standard Deviation

Equation:[51]

$$SD_{single} = \sqrt{\frac{\sum(X - \bar{X}_{E\&C})^2}{N_E + N_C - 1}}$$

Where X is the value of any observation in the sampled groups, $\bar{X}_{E\&C}$ is the mean of groups E and C, N_E is the total number of observations in group E, and N_C is the total number of observations in group C.

Explanation: This equation does not require a full population of data; rather, it combines the observations in the test and comparison groups to create a commingled group. The means used in calculating the standard deviation change each time the compositions of the test and comparison groups change. Thus, the figure produced by the equation changes each time one runs the Cohen's *d* test because the means ($\bar{X}_{E\&C}$) are the means of distinct test and comparison groups. Note that Commerce, rather than the statistics literature on the record, provides this equation, and Commerce does not offer a source in support.[52] *Amici* identified

[51] Appx2417.

[52] *See* Appx2417.

sources indicating that this equation is meant for calculating the standard deviation for samples of data, not for a population.[53]

Each of these methods finds support in the literature as a means of calculating the denominator for Cohen's *d* in certain circumstances. Using a method not described above (or not otherwise endorsed by the statistics literature), or using one of the methods under inappropriate circumstances yields a *d* coefficient that cannot serve as a consistent "yardstick" to measure the differences between the groups.[54] Without a consistent yardstick to scale the mean difference, the resulting *d* coefficient cannot be interpreted using Cohen's thresholds because the thresholds were created using an appropriately scaled *d* coefficient.[55]

II. Commerce Has Not Provided and Cannot Provide a Reasonable Explanation for Using Simple Averaging When the Groups Violate the Assumptions of Equal Variances and Equal Size.

In *Mid Continent V*, this Court recognized that Commerce is not bound to adhere to the statistics literature if "the literature is inapplicable to the specific

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[53] *See Cohen* at 66–67 (Appx1955) (explaining the typical function of the variables $\bar{X}$ and N in calculating the denominator); Wachs, *What Is a Standard Deviation* at 3; Xiang Wan, Wenqian Wang, Jiming Liu, Tiejun Tong, *Estimating the Sample Mean and Standard Deviation from the Sample Size, Median, Range and/or Interquartile Range*, 14:135 BioMed Central Medical Research Methodology at 2 (2014).

[54] *Coe* at 2 (Appx1961).

[55] *See infra* Section II.C.

problem before the agency or {the literature} is not itself well grounded."[56] The Court was clear, however, that a departure from the statistics literature upon which Commerce has relied in formulating its test must be based on a reasonable justification.[57] Here, Commerce's purported justification is not reasonable.

First, there is no gap in the statistics literature that needs to be filled. The literature addresses how to calculate a Cohen's *d* denominator for populations with different variances. Second, Commerce's "reliability" rationale for simple averaging standard deviations is unreasonable, illogical, and at odds with basic principles of statistics and mathematics. Third, Commerce cannot explain why the *d* coefficients that it calculates by "go{ing} beyond" the literature can be treated as functionally identical to the thresholds based on a different calculation of Cohen's *d*.

A. Commerce Fails to Reasonably Explain Its Rationale for Departing from the Literature.

Commerce claims that it must "go beyond"[58] the statistics literature because the statistics literature "assumes sampling for all options,"[59] and thus "is

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[56] Appx984.

[57] Appx984.

[58] Appx2463.

[59] Appx2423.

inapplicable to the specific problem before the agency."[60] Similarly, Commerce claims that this Court and the CIT interpreted the statistics literature to limit use of equation 2.3.2 to sampled data.[61] Commerce's characterizations of the literature and judicial interpretations of the literature are unreasonable.

First, the literature *does* address calculating the Cohen's *d* denominator for full populations. As discussed above in Section I and further in Section III, if one has access to the complete set of data (i.e., a full population), then the literature supports using **Method 1** to calculate the denominator. Even if one could not use **Method 1**, nothing in the statistics literature indicates that **Methods 2** or **3** are limited to sampling where the full population data are unknown.

For example, Ellis suggests using different methods (including **Method 3**) for calculating the denominator when "compar{ing} groups," not just "samples."[62] Although Ellis assumes that the test and comparison groups were "sampled" from a larger population, his work does not suggest that the principles apply only when the population data are unknown or only apply to samples.[63] To the contrary,

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[60] Appx984.

[61] Appx2409; *see also* Appx2423.

[62] *Ellis* at 9–11 (Appx1885–Appx1887).

[63] Ellis references samples and sampling, but never suggests that his analyses are limited to sampling. *See id.* at 9–11 (Appx1885–Appx1887).

Ellis's description of "sampling"—selecting the test and comparison groups from a broader population of data—is functionally identical to Commerce's method of selecting the test and comparisons groups from a broader set of data (all U.S. prices for a particular product).[64] Commerce's supposed use of full populations does not negate the applicability of Ellis's analysis. Thus, Commerce's assertion that Ellis does not contemplate how to calculate the denominator for populations is not supported by the statistics literature.

Similarly, Coe discusses how to calculate the denominator when using samples because he assumes that the broader group data will not be available.[65] To be sure, there may not be any reason to calculate the standard deviation using **Methods 2** or **3** when the broader group's (i.e., the full population's) standard deviation is known. That does not mean, however, that the principles underlying those **Methods** require the use of sampled data.[66] Commerce is simply incorrect that the statistics literature only speaks to the appropriate calculation of the Cohen's *d* denominator when comparing sampled data.

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[64] *Id.* at 10 (Appx1886).

[65] *Coe* at 2 (Appx1961) (explaining that a researcher will rarely have access to a full population).

[66] *Id.* at 6 (Appx1965); *contra* Appx2415 (citing *Coe* at 6 (Appx1965)).

Commerce also claims that the literature and the courts' interpretations teach that "Dr. Cohen's equation 2.3.2, applies to an analysis involving sampled data."[67] This Court has observed that equation 2.3.2 is only appropriate when the "groups" are of equal size, but it did not suggest that "groups" means "samples."[68] While in *Mid Continent VI* the CIT noted that equation 2.3.2 may be applied to samples, it does not follow that equation 2.3.2 is *limited* to sampling.[69]

Neither does Cohen himself suggest that equation 2.3.2 is appropriate only when using sampled data. To the contrary, Cohen explains that equation 2.3.2 should be used "{f}or normal *populations* of unequal variances" and equal size.[70] The statistics literature does not support Commerce's incorrect use of equation 2.3.2 because the data Commerce uses do not satisfy the assumption of equal size. The problem has nothing to do with a distinction between samples and populations.

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[67] Appx2411; *see also* Appx2423 & n.88 (claiming that "Commerce must go beyond the academic literature because Commerce uses populations, and the courts' understanding the academic literature assumes sampling for all options to calculate the denominator of the Cohen's *d* coefficient") (citing Appx1727).

[68] Appx984.

[69] Appx1727.

[70] *Cohen* at 43–44 (Appx1943–Appx1944) (emphasis added).

B. Commerce's "Reliability" Rationale Is Not Reasonable.

Having insisted (erroneously) that its use of populations instead of samples necessitated a non-standard methodology for calculating the Cohen's *d* denominator, Commerce attempts to validate its methodology based on "reliability," a statistical concept that applies only to samples. Indeed, Commerce makes that plain when it asserts that "sample size is a gauge of the reliability of the sample results," such that the reliability of a standard deviation is a function of sample size.[71] Commerce further contends that:

> when the sample sizes of the two groups are equal, then the reliability of the estimates of the standard deviations are the same, and it is appropriate to give equal weights, *i.e.*, a simple average, when averaging the two standard deviations to calculate the denominator of the Cohen's *d* coefficient.[72]

According to Commerce, each test group and comparison group is a full population of data, and the standard deviation of a population is 100% reliable, so, regardless

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[71] Appx2410–Appx2411.

[72] Appx2411.

of the relative size of the groups, each should be weighted equally in the Cohen's *d* denominator.[73]

This explanation begins with an inferential leap that simply has no basis in the literature or logic. Commerce observes that Cohen endorses simple averaging of standard deviations for the Cohen's *d* denominator when comparing groups with different standard deviations, but of the same size.[74] Commerce decides that the reason for simple averaging when dealing with two groups of equal size is not the equal size itself, but rather the equal reliability of estimated standard deviations that the equal size implies.[75] Of course, neither Cohen nor any other source makes this connection, which should not be surprising because it makes no sense. When dealing with two groups of the same size, a simple average is the same as a weighted average based on size. Cohen is weighting by size, not by reliability.

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[73] Appx2412–Appx2413

[74] Appx2411.

[75] *See* Appx2411 ("Because the sample sizes are equal in size and reliability, the estimated standard deviation for each of the sample group also has the same 'reliability' (or precision) of a sample value . . . .").

Commerce has no support for its inferential leap that size serves as a proxy for reliability.

Commerce's inferential leap is, in fact, contrary to the general principles of statistics on which Commerce purports to rely because it depends on the erroneous premise that reliability has any meaning when used to describe a statistic in a single group of data (including a population). Reliability measures "the extent to which one can generalize from an instrument administered under one circumstance at one point in time to other circumstances at other points in time."[76] Cohen explains that the relationship between an observed effect size[77] and true effect size[78] "is a simple function of reliability."[79] Reliability speaks to the accuracy of inferences that can be made about a population based on samples drawn from that population. This is a peculiar concept for Commerce to invoke given that Commerce insists that its use of Cohen's *d* has nothing to do with drawing

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[76] Jum C. Nunnally, *Psychometric Theory — 25 Years Ago and Now* at 10 (Nov. 1975) ("*Nunally*").

[77] This is the effect size that is actually measured during an experiment.

[78] This is the effect size that would be calculated if the experiment could be conducted without any error affecting the result.

[79] *Cohen* at 536 (pages 535–57 of *Cohen* discuss the concept of reliability in detail but are not part of the joint appendix); *see also id*. at 6 (Appx1925).

inferences based on sampled data.[80] But reliability can describe a statistic only in *sampled data* and is a tool in drawing inferences from that sampled data.[81] The concept of reliability simply does not apply when working solely with full populations.

Finally, Commerce's rationale merely proves the truism that the standard deviation in a set of data is equal to itself.[82] It is a meaningless tautology that lends no support to Commerce's use of equation 2.3.2 because it does not provide any information about the standard deviation, much less information about weighting. The statistics literature is clear that pooling unequal standard deviations in the calculation of Cohen's *d* requires weighting based on group size.[83] Using Cohen's *d* to compare groups has nothing to do with the reliability of those groups' standard deviations as estimates of a population standard deviation. Commerce's insistence

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[80] *See id.* at 536.

[81] *Id.* at 6 (Appx1925), 536; *Nunally* at 10.

[82] Commerce could limit its examination to any group of data, describe that group as a population, and insist that the values in that group are 100% reliable. Meanwhile, the group of data under examination is actually a subset of a larger group of data, such that the actual reliability of the observed value in that group of data is based on the relationship between the observed value and what the value would be absent any error. Thus, Commerce's reliability explanation provides no information at all, it simply says that a statistic is itself.

[83] *Cohen* at 43–44 (Appx1943–Appx1944); *Coe* at 6 (Appx1965); *Ellis* at 10 (Appx1886).

that reliability is the actual, though unarticulated, basis for weighting unequal standard deviations does not "go beyond" the statistics literature, it runs directly contrary to the statistics literature.

C. Commerce Must Calculate a *d* Coefficient That Reasonably Measures the Difference Between U.S. Prices.

In *Mid Continent V*, this Court explained that Commerce's obligation to follow the statistics literature follows from its duty "to implement the statutory mandate to determine when prices of certain groups 'differ significantly.'"[84] The sales that pass the Cohen's *d* test determine the results of the ratio test, and the ratio test determines the outcome of the meaningful-difference test.[85] Assuming, *arguendo*, that Commerce's reliability rationale reasonably ties the concept of reliability to the weight assigned to the groups' standard deviations, Commerce still cannot explain how using equation 2.3.2 when group sizes differ produces a *d* coefficient that can be meaningfully interpreted using Cohen's thresholds.

Commerce's so-called logic connecting reliability to weighting does not bridge the gap between a *d* coefficient calculated using a method not supported by statistics literature to Cohen's thresholds. Cohen creates his 0.8 threshold (and the other thresholds) using two steps. First, Cohen defines *d* as a measure of

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[84] Appx984 (quoting 19 U.S.C. § 1677f-1(d)(1)(B)(i)).

[85] Appx984; *see also* 19 U.S.C. § 1677f-1(d)(1)(B).

"nonoverlap" that can be calculated and meaningfully interpreted when "the populations being compared are normal" have "equal variability," and are "equally numerous."[86] The assumptions ensure that the denominator of the *d* coefficient provides context to the difference in the means. Cohen explains that, because there is a common standard deviation in the groups, the denominator provides a single scale for expressing the mean difference.[87] Cohen provides a table showing how incremental *d* coefficients correlate to percentages of nonoverlap.[88]

This is how the results of the Cohen's *d* test are meant to be interpreted—correlating to measures of nonoverlap, contextualized in a single scale, and using data that satisfy the assumptions. Cohen's thresholds for interpreting *d* are meaningful only when *d* is calculated under these conditions such that the measures of nonoverlap and *d* align with Cohen's table.

Second, Cohen considers real-world data that satisfy these assumptions and compares differences in those data to calibrate his thresholds of 0.2, 0.5, and 0.8 (small, medium, and large, respectively). For example, Cohen compares the mean

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[86] *Cohen* at 21 (Appx1932).

[87] *See id.* (Appx1932) (explaining for a certain example that the "standard deviation is σ = 100 scale points" resulting in a *d* coefficient "freed of dependence upon any specific unit of measurement").

[88] *Id.* at 22 (Table 2.2.1) (Appx1933).

difference in the heights between 13- and 18-year-old girls—height data being a type that conforms to the assumptions.[89] The Cohen's *d* coefficient for this comparison is 0.8.[90] The real-world observable difference between the heights in these two age groups is "grossly perceptible."[91] This observation supports Cohen's conclusion that a *d* of 0.8 correlates to a large or grossly perceptible difference.[92]

When Commerce calculates the denominator of Cohen's *d* using equation 2.3.2 and the data violate the assumptions of equal variance and equal size, then the denominator does not contextualize the mean difference as Cohen intended. Essentially, Commerce creates a denominator that combines two different scales without translating the different units through weighting. Whatever else Commerce may say about that denominator, the literature is clear that Commerce

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[89] *Id.* at 27 (Appx1935). Cohen does not provide the height and intelligence data from which he calculated his illustrative examples of *d*. That these types of data conform to the assumptions is a fact "that is not subject to a reasonable dispute because it . . . is generally known" and "can be accurately and readily determined from sources whose accuracy cannot reasonably be questioned." Fed. R. Evid. 201(b). Moreover, height data from the Centers for Disease Control and Prevention ("CDC") confirms the normal distribution and roughly equal variance of the heights of 13-year-old and 18-year-old girls. *See CDC*, Data Table of Stature-for-age Charts, *available at* https://www.cdc.gov/growthcharts/html_charts/statage.htm#females (last updated Aug. 23, 2001).

[90] *Cohen* at 27 (Appx1935).

[91] *Id.* (Appx1935).

[92] *Id.* (Appx1935).

is not calculating or approximating the denominator in a way that resembles Cohen's denominator. The resulting *d* coefficient cannot be interpreted using the thresholds because Cohen created those thresholds using data that contextualizes mean differences in a single, common scale. Commerce's *d* may equal 0.8, but that number does not connote a significant difference because it is not properly scaled. Commerce cannot use such a method to identify significant price differences within the meaning of 19 U.S.C. § 1677f-1(d)(1)(B)(i). This is true regardless of the rationale Commerce uses for simple averaging the denominator when the groups are different sizes.

III. Commerce Fails to Reasonably Explain Why It Fails to Use a "Single Standard Deviation" for the Denominator.

Commerce rejects this Court's suggestion to use "the standard deviation of the entire population as the denominator in Cohen's *d*."[93] But Commerce's rejection confuses the methods for calculating the denominator. Commerce's critiques of **Method 4** (described in Section I) as the single standard deviation are irrelevant because that equation is not the method that the literature prescribes for calculating the standard deviation for a population. **Method 1**, which calculates a population standard deviation, is the approach recommend by the statistics literature to calculate the Cohen's *d* denominator. Commerce has not offered a

[93] Appx984; *see also* Appx2413–Appx2418.

reasonable explanation for eschewing the statistically sound approach to calculating the denominator and has thus failed to address an important aspect of the problem before it.

Commerce argues that "using the standard deviation of all sale prices in the test and comparison groups as the denominator" is inappropriate because this standard deviation "would be calculated for populations A and B as a single population based on commingled sale prices."[94] Commerce asserts that the denominator would be affected by the difference in the means between the two groups even though there would be "no change in the variances."[95]

Commerce confuses **Method 1** with **Method 4**. Recall that **Method 4** uses the following equation:

$$SD_{single} = \sqrt{\frac{\sum(X - \bar{X}_{E\&C})^2}{N_E + N_C - 1}}$$

[94] Appx2414–Appx2415.

[95] Appx2417.

Although Commerce does not cite a source for this equation, other sources establish that **Method 4** calculates the standard deviation for sampled data.[96] Conversely, **Method 1** calculates the standard deviation for a *population*:[97]

$$\sigma = \sqrt{\frac{\sum(X-\mu)^2}{N}}$$

Notice that in **Method 4** the denominator is a function of the means of the test and comparison groups and must be recalculated when the test and comparison groups change. Commerce rejected using **Method 4** on this basis, observing that the mean difference between the test and comparison groups would impact the denominator.[98] Conversely, for **Method 1**, the equation is calculated only once, using the mean of the entire population. Unlike **Method 4**, the mean difference between the test and comparison groups has no impact on **Method 1**. Had Commerce considered the method contemplated by Coe and Ellis to calculate the denominator, it would not have encountered the issue it claims makes **Method 4** unfit.

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[96] *See supra* note 53, and accompanying text.

[97] *See supra* note 42, and accompanying text.

[98] Appx2416–Appx2417.

In *Mid Continent V*, this Court correctly observed that the literature supports using **Method 1** when the full universe of data (i.e., the group of data from which the test and comparison groups are selected) is available.[99] This Court's observation and the literature's consistent preference for using the population standard deviation make Commerce's decision whether to use **Method 1** an important aspect of the problem before the agency.

It is undisputed that Commerce has the broader set of data from which the test and comparison groups were selected. The broader group is exactly what Coe and Ellis refer to when discussing a population standard deviation.[100] Moreover, Commerce's remand redetermination shows that Commerce did not actually consider the equation for calculating a population standard deviation (as in **Method 1**), but used an equation for calculating a standard deviation for sampled data (as in **Method 4**).[101] Consequently, Commerce has not provided a reasonable explanation for refusing to use a population standard deviation as the denominator

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[99] Appx984.

[100] *See Ellis* at 10 (Appx1886) (explaining that the mean difference is divided "by the standard deviation (SD) of the population from which the groups were sampled"); *Coe* at 2 (Appx1961) ("Here {the denominator} refers to the standard deviation of the population from which the different treatment groups were taken.").

[101] Appx2417.

in its Cohen's *d* calculation and failed to address an important aspect of the issue before the agency.[102]

CONCLUSION

This Court and the CIT have remanded Commerce's methodology in this proceeding several times. Each time, Commerce has misunderstood the statistics literature and misconstrued it in an effort to defend its prior position, which has never been defensible. In the instant remand, the courts instructed Commerce to recognize the errors in its methodology, but Commerce continues to misapprehend the statistics literature and principles on which it purports to rely. The history of this case gives every indication that Commerce will continue to develop new rationales for simple averaging, each more attenuated from the literature than the last, until this Court directs Commerce to cease its unreasonable practice. Before this Court is a unique opportunity. This Court may recognize Commerce's methodology for what it is: an unjustifiable methodology that yields arbitrary and unprincipled outcomes. *Amici* respectfully suggest that this Court should make clear that Commerce cannot continue to rely on its Cohen's *d* test as long as the

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[102] *Dep't of Homeland Sec. v. Regents of the Univ. of Cal.*, 140 S. Ct. 1891, 1913 (2020) (failing to consider an important aspect of the problem "alone renders {the} decision arbitrary and capricious"); *see also Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins.*, 463 U.S. 29, 43 (1983).

outcome of that test depends on unreasonable and statistically unsound calculation methodologies.

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Respectfully submitted,

/s/ R. Will Planert
R. Will Planert
Julie C. Mendoza
Donald B. Cameron
Brady W. Mills
Mary S. Hodgins
Nicholas C. Duffey
MORRIS, MANNING & MARTIN LLP
1333 New Hampshire Ave., NW
Suite 800
Washington, D.C. 20036
(202) 216-4819
wplanert@mmmlaw.com
Counsel to Canfor Corporation, Canadian Forest Products, Ltd., and Canfor Wood Products Marketing, Ltd

/s/ Eric S. Parnes
Eric S. Parnes
Joanne E. Osendarp
Alan G. Kashdan
Tyler J. Kimberly
BLANK ROME LLP
1825 Eye Street, NW
Washington, DC 20006
(202) 420-5479
eric.parnes@blankrome.com
Counsel to the Government of Canada

/s/ Jay C. Campbell
Jay C. Campbell
WHITE & CASE LLP
701 Thirteenth Street, NW
Washington, DC 20005
(202) 626-3600
jcampbell@whitecase.com
Counsel to J.D. Irving, Limited

/s/ Elliot J. Feldman
Elliot J. Feldman
Michael S. Snarr
Tung A. Nguyen
BAKER HOSTETLER LLP
1050 Connecticut Ave., NW
Eleventh Floor
Washington, DC 20036
(202) 861-1679
efeldman@bakerlaw.com
Counsel to Resolute FP Canada Inc.

/s/ Henry D. Almond
Henry D. Almond
Kang Woo Lee
ARNOLD & PORTER KAYE SCHOLER LLP
601 Massachusetts Ave., NW
Washington, D.C. 20001
(202) 942-5000
henry.almond@arnoldporter.com
Counsel to Tolko Industries Ltd. and Tolko Marketing and Sales Ltd.

/s/ Donald Harrison
Donald Harrison
GIBSON, DUNN & CRUTCHER LLP
1050 Connecticut Ave., NW
Washington, D.C. 20036
(202) 955-8500
DHarrison@gibsondunn.com
Counsel to West Fraser Mills Ltd.

CERTIFICATE OF COMPLIANCE

CAFC Court No. 2024-1556
Mid Continent Steel & Wire, Inc. v. United States

The foregoing filing complies with the relevant type-volume limitation of the Federal Rules of Appellate Procedure and Federal Circuit Rules because it contains 6,965 words, which does not exceed the maximum authorized by Federal Circuit Rule 29(b).

Date: May 28, 2024

Signature: */s/ Eric S. Parnes*

Name: Eric S. Parnes

CERTIFICATE OF SERVICE

Mid Continent Steel & Wire, Inc. v. United States
CAFC Court No. 2024-1556

The undersigned hereby certifies that on, May 28, 2024, the foregoing Brief of The Government of Canada; Canfor Corporation; Canadian Forest Products, Ltd.; Canfor Wood Products Marketing, Ltd.; J.D. Irving, Limited; Resolute FP Canada Inc.; Tolko Industries Ltd.; Tolko Marketing and Sales Ltd.; and West Fraser Mills Ltd. as *Amici Curiae* In Support of Defendants-Appellants and Urging Reversal, was filed using the Court's CM/ECF System, which will serve via e-mail notice of filing to all counsel registered as CM/ECF users, including the following counsel for the parties:

Adam H. Gordon, Esq.
The Bristol Group PLLC
1707 L Street NW
Suite 570
Washington, D.C. 20036
adam.gordon@bristolgrouplaw.com
On Behalf of Mid Continent Steel & Wire, Inc.

Mikki Cottet, Esq.
United States Department of Justice
Commercial Litigation Branch
Civil Division
PO Box 480
Ben Franklin Station
Washington, D.C. 20044
Mikki.Cottet@usdoj.gov
On Behalf of the United States

Ned H. Marshak, Esq.
Grunfeld, Desiderio, Lebowitz, Silverman & Klestadt LLP
599 Lexington Avenue
36th Floor
New York, NY 10022
nmarshak@gdlsk.com
On Behalf of PT Enterprise Inc., Pro-Team Coil Nail Enterprise Inc., Unicatch Industrial Co., Ltd., WTA International Co., Ltd., Zon Mon Co., Ltd., Hor Liang Industrial Corporation, President Industrial Inc., and Liang Chyuan Industrial Co., Ltd.,

/s/ Eric S. Parnes

Eric S. Parnes
Blank Rome LLP
1825 Eye Street, NW
Washington, D.C. 20006
Counsel to the Government of Canada