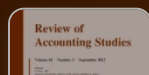


[Home](#) > [Review of Accounting Studies](#) > [Article](#)

Financial statement effects of adopting international accounting standards: the case of Germany

| Published: 24 July 2007

| Volume 12, pages 623–657, (2007) [Cite this article](#)



[Review of Accounting Studies](#)

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

- > **Store and/or access information on a device**
- > **Personalised advertising and content, advertising and content measurement, audience research and services development**

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)



This is a preview of subscription content, [log in via an institution](#)  to check access.

Access this article

Log in via an institution →

Subscribe and save

✓ Springer+ Basic

€32.70 /Month

- Get 10 units per month
- Download Article/Chapter or eBook
- 1 Unit = 1 Article or 1 Chapter
- Cancel anytime

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **[privacy policy](#)** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

Accept all cookies

Reject optional cookies

Manage preferences

Explore related subjects

Discover the latest articles and news from researchers in related subjects, suggested using machine learning.

[Accounting](#)[Financial Reporting](#)[Financial History](#)[International Finance](#)[Public Accounting](#)[Financial Accounting](#)

Notes

1 For ease of exposition, we use the term “IAS” to refer to both the International

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)[Reject optional cookies](#)[Manage preferences](#)

Raising Facilitation Act (KapAEG) in 1998, which allows German listed firms to prepare their consolidated financial statements according to internationally accepted accounting standards instead of German accounting standards.

5. For example, the core standards were the standards being considered for endorsement by the International Organization of Securities Commissions (IOSCO). The endorsement of IAS by IOSCO was one of the key factors for the European Commission's decision to adopt IAS.
6. Additional sensitivity tests find that our overall conclusions are robust to deleting firms listed in the New Market (Neuer Market), using a bootstrapping procedure for the significance tests, scaling all variables by lagged market values in our value relevance tests, and using future prices rather than current

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

accordance with principles generally accepted in the United States and generally in accordance with IASC and OECD guidelines. We only focus on “DI” to identify IAS adopters because none of the German companies in Compustat have the accounting codes “DA” or “DT” during our sample period.

10. One firm’s accounting standard codes change from “DS” to “DU” and then to “DI” during our sample period, where “DU” denotes “Domestic standards in accordance with principles generally accepted in the United States.” We check the accounting standards in the company’s annual reports throughout our sample period. We find that the codes “DU” should have been “DS” and make the corrections accordingly.

11. While verifying our data, we ensure that the reported financial statement

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

reported in its 2000 annual report are based on HGB, we are able to obtain both HGB and IAS data for 2000.

14. We note that while firms with a book value or net income reconciliation likely differ from those without a reconciliation in terms of firm size or investor base, we do not expect the differences to affect our overall inferences: Our conclusions regarding accounting differences are based on the interpretation of the accounting standards.
15. Five (three) firms provide a book value (net income) reconciliation for two separate years. We note that the years for which firms provide reconciliation adjustments vary. While most firms provide reconciliation adjustments on the beginning balance of book values in their annual reports of the IAS adoption

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

the balance sheets, we note that the effect of the accounting difference related to goodwill on net income during the reporting period depends not only on the total amount of capitalized goodwill but also on the amortization schedule.

20. While we have 84 observations for book value of equity and net income, we only have 81 observations for other key accounting numbers. This is because we are not able to obtain restated total assets, total liabilities, and sales revenue numbers from book value and net income reconciliation adjustments. (Recall that in the sample selection description, we gather three additional observations on book value of equity and net income from firms that disclose two-year book value and net income reconciliations.)

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

power because of the relatively small sample sizes in our paper compared with typical market-based analyses.

24. The Vuong ([1989](#)) statistic has been used extensively in accounting research to test for significant differences in R^2 across different regressions. The Vuong ([1989](#)) test is a likelihood-ratio test of non-nested difference in explanatory power between two models, under the null hypothesis that either model is “true.” The only two requirements of the test are that the dependent variable must be identical across the two models and the regression models should be non-nested.
25. We test the difference in coefficients based on t -tests generated from “stacked” regressions. These t -statistics are generated using strong

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

with institutional factors such as shareholder protection or the legal system playing a more important role than accounting standards in determining conditional conservatism of accounting earnings (Ball et al. [2003](#)). However, these inferences are subject to the alternative explanation that our tests lack power to detect differences in asymmetric timeliness across the two systems.

29. We choose eight months after the fiscal year-end because German companies are required to report their annual earnings to the public within eight months of the fiscal year-end (Alford et al. [1993](#)). Thus, examining eight months after the fiscal year-end of the following year ensures that both IAS and HGB information is available to the stock market.

30. We also note that prior studies have not been able to document that firms

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

33. We note that this analysis is based on a sample of 60 observations due to missing values in lagged market values. Thus, the loss of significance could result from the relatively low power in the reduced sample. Additional analysis restricting the tests in Tables [5](#) and [6](#) to the subsample with available lagged market values indicates that the significance levels are lower. Specifically, the analysis (not tabulated) shows that (1) the difference in book value coefficients under IAS and HGB in Panel A of Table [5](#) becomes significant at only $p = 10\%$ (two-tailed); (2) the coefficient on book value adjustments in Panel B of Table [5](#) becomes insignificant at conventional levels; and (3) the difference in adjusted- R^2 between the HGB and IAS models in Panel A of Table [5](#) becomes insignificant at conventional levels.

References

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

Ashbaugh, H., & Olsson, P. (2002). An exploratory study of the valuation properties of cross-listed firms' IAS and U.S. GAAP earnings and book values. *The Accounting Review*, 77, 107-126.

[Article](#) [Google Scholar](#)

Ball, R., Kothari, S. P., & Robin, A. (2000). The effect of international institutional factors on properties of accounting earnings. *Journal of Accounting and Economics*, 29, 1-51.

[Article](#) [Google Scholar](#)

Ball, R., Robin, A., & Wu, L. S. (2002). Incentives versus standards: Properties of

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

Accept all cookies

Reject optional cookies

Manage preferences

Basu, S. (1997). The conservatism principle and the asymmetric timeliness of earnings. *Journal of Accounting and Economics*, 24, 3–37.

[Article](#) [Google Scholar](#)

Belsley, D. A., Kuh, E., & Welsch, R. E. (1980). *Regression diagnostics*. Wiley, New York, NY.

[Google Scholar](#)

Biddle, G., Seow, G., & Siegel, A. (1995). Relative versus incremental information content. *Contemporary Accounting Research*, 12, 1–23.

[Article](#) [Google Scholar](#)

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

assets: Association with share prices and nonmarket based value estimates.
Journal of Accounting Research, 36(Supplement), 235-247.

[Article](#) [Google Scholar](#)

Efron, B., & Tibshirani, R. (1993). *An introduction to the bootstrap*. Chapman & Hall, New York, NY.

[Google Scholar](#)

Ernst and Young. (2004). Effects of adopting IAS: 2002-2005.
http://www.ey.com/GLOBAL/content.nsf/International/Assurance_-_IAS_-_Effects_of_Adopting_IAS_2002_-_2005.

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

- Store and/or access information on a device**
- Personalised advertising and content, advertising and content measurement, audience research and services development**

Accept all cookies

Reject optional cookies

Manage preferences

Heckman, J. (1979). Sample selection bias as a specification error. *Econometrica*, 47, 153-161.

[Article](#) [Google Scholar](#)

Hofheinz, P. (2002). EU to embrace accounting method not used in U.S. *The Wall Street Journal June 2*, A12.

Hung, M. (2000). Accounting standards and value relevance of earnings: An international analysis. *Journal of Accounting and Economics*, 30, 401-420.

[Article](#) [Google Scholar](#)

Joos, P., & Lang, M. (1994). The effects of accounting diversity: Evidence from the

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

Leuz, C. (2003). IAS versus U.S. GAAP: Information asymmetry-based evidence from Germany's New Market. *Journal of Accounting Research*, 41, 445–427.

Leuz, C., & Verrecchia, R. (2000). The economic consequences of increased disclosure. *Journal of Accounting Research*, 38(Supplement), 91–124.

Leuz, C., & Wustemann, I. (2004). The role of accounting in the German financial

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

We thank Russell Lundholm (editor), an anonymous reviewer, Mark DeFond, Robert Roussey, Robert Trezevant, and the workshop participants at the 2005 American Accounting Association Annual Meeting for their helpful comments and suggestions. In addition, we thank Siqi Li and Iris Kuhn for excellent research assistance. This project was completed while Mingyi Hung was visiting The Chinese University of Hong Kong. We appreciate funding from the RGC Research Grant of The Chinese University of Hong Kong.

Author information

Authors and Affiliations

Leventhal School of Accounting, Marshall School of Business, University of Southern California, Los Angeles, CA, 90089-0441, USA

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device
Personalised advertising and content, advertising and content measurement, audience research and services development

- Accept all cookies
- Reject optional cookies
- Manage preferences

[7] The impact of the adoption of IAS for financial reporting

The BMW Group financial statements have been prepared and presented as if they had always been prepared in accordance with IAS and IAS Interpretations. The adjustment resulting from the conversion to IAS has been treated as an adjustment to the opening balance of equity...

1.1.1 Equity

Equity under IAS increases by euro 4,536 million (+92.6%). The following summary shows the recognition and measurement differences between HGB and IAS and reconciles the equity at 31 December 2000 under HGB to the equity on the first day of the following year, 1 January 2001, under IAS:

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

Accept all cookies

Reject optional cookies

Manage preferences

No accounting and valuation methods under German law were applied which are not compliant with IAS or SIC.

The requirements of section 292a of the German Commercial Code (HGB) for release from the obligation to draw up consolidated financial statements under the HGB are satisfied. Evaluation of these requirements is based on the German Accounting Standard No. 1 (DRS 1) published by the German Standardisation Council.

The previous year's consolidated financial statements were drawn up under the HGB regulations, and the financial statements in the year under review are the first to be drawn up under IAS regulations...

Conversion of shareholders' equity presentation to IAS:

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to springer.com and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

Accept all cookies

Reject optional cookies

Manage preferences

Hung, M., Subramanyam, K.R. Financial statement effects of adopting international accounting standards: the case of Germany. *Rev Acc Stud* **12**, 623–657 (2007). <https://doi.org/10.1007/s11142-007-9049-9>

Published

24 July 2007

DOI

<https://doi.org/10.1007/s11142-007-9049-9>

Issue Date

December 2007

Keywords

[International Accounting Standards](#)

[Germany](#)

[Fair-value accounting](#)

JEL Classifications

[M41](#)

[G15](#)

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 **partners**, also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our **privacy policy** for more information on the use of your personal data. Your consent choices apply to [springer.com](https://www.springer.com) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)

Your privacy, your choice

We use essential cookies to make sure the site can function. We, and our 93 [partners](#), also use optional cookies and similar technologies for advertising, personalisation of content, usage analysis, and social media.

By accepting optional cookies, you consent to allowing us and our partners to store and access personal data on your device, such as browsing behaviour and unique identifiers. Some third parties are outside of the European Economic Area, with varying standards of data protection. See our [privacy policy](#) for more information on the use of your personal data. Your consent choices apply to [springer.com](#) and applicable subdomains.

You can find further information, and change your preferences via 'Manage preferences'. You can also change your preferences or withdraw consent at any time via 'Your privacy choices', found in the footer of every page.

We use cookies and similar technologies for the following purposes:

Store and/or access information on a device

Personalised advertising and content, advertising and content measurement, audience research and services development

[Accept all cookies](#)

[Reject optional cookies](#)

[Manage preferences](#)