

Critical Minerals Monitor

Copper and nickel prices declined following President Trump's April 2 tariff announcement, reflecting weakened expectations for future economic growth. Prices subsequently recovered as the administration backtracked and delayed implementation. Nevertheless, persistent policy uncertainty continues to weigh on consumer confidence.

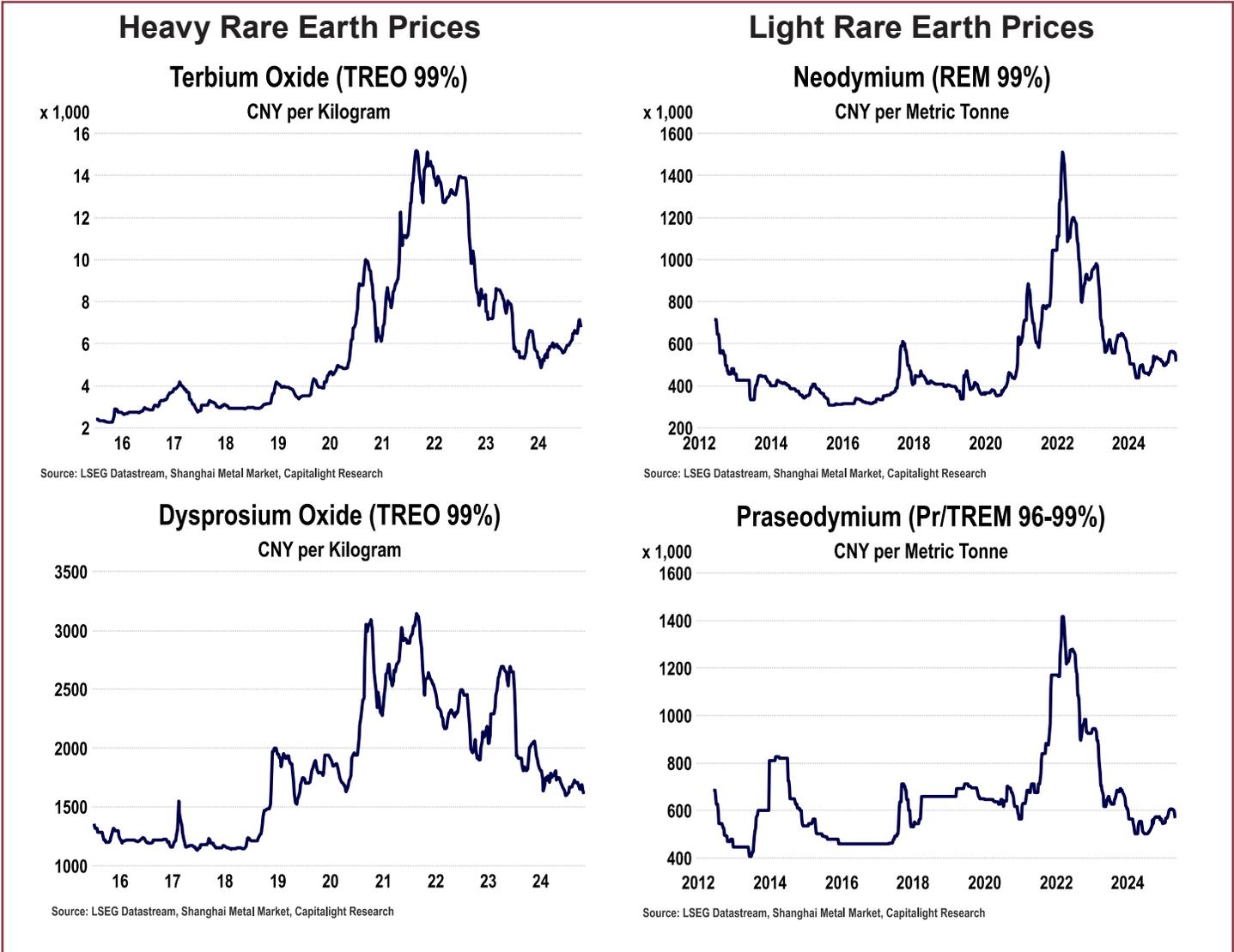
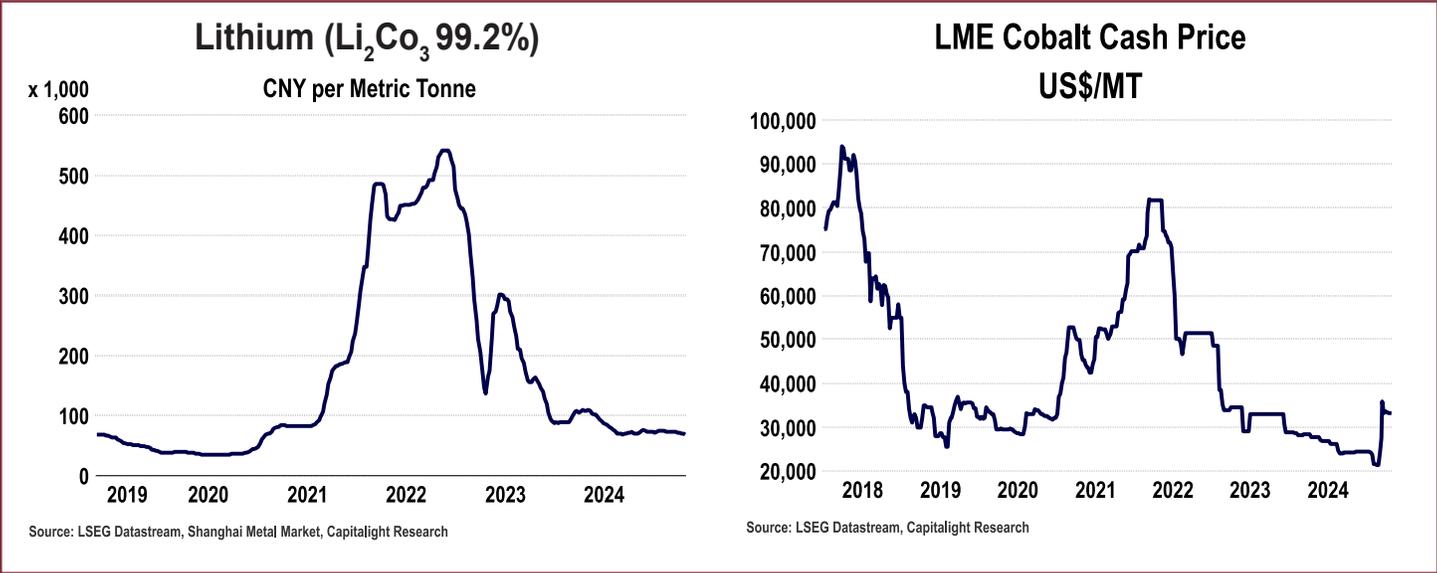
The University of Michigan's final *Consumer Sentiment Index* for April fell to 52.2, down from 57.0 in March. Inflation expectations also worsened: five-year expectations rose to 4.4%, and one-year expectations surged to 6.5%—the highest level since 1981. The Atlanta Fed's *GDPNow* model now projects a 2.5% contraction in U.S. GDP for the first quarter.

Not surprisingly, trade tensions and unpredictable U.S. policy were central themes at this week's World Bank and IMF meetings. Reflecting these growing concerns, the IMF downgraded its 2025 global growth forecast to 2.8%, from 3.3%. As Bloomberg (April 25) observed: ... *Bear in mind, the administration's preoccupation with nontariff barriers and 'unfair trade' is by no means unwarranted. Escalating tariffs certainly aren't the answer—but purposeful talks on such impediments are eminently desirable. If this week's meetings signal a reviving spirit of international cooperation, that might go a long way toward lifting the gloom.*

Ongoing uncertainty around President Trump's evolving trade policies is expected to keep markets volatile in the months ahead.

*This month we feature the third in a series of research articles in collaboration with the Colorado School of Mines. The deep dive article starting on page 3 titled **Dr. Copper, I Presume?** was written by London Spivey (london_spivey@mines.edu), whom is a graduate student in the Mineral and Energy Economics program at the Colorado School of Mines.*





Dr. Copper, I Presume?

In this article we discuss economic indicators and focus on copper's reputation as a leading indicator of economic growth (as measured by gross domestic product (GDP)*. We will then compare copper prices to the various economic growth rates from the world total down to various geographic regions. Finally, we end with the disclaimer that economic indicators, while effective, are complex and should not be used in isolation (a fact also demonstrated throughout the ensuing analysis).

What is an economic indicator?

Everyone wants to know the future, especially as it pertains to money and business. The field of macroeconomics deals with the study of large-scale economies (typically national and/or global) and using past relationships between various factors within those economies to predict future movements and growth prospects¹. These factors and their interactions are generally separated into what are called "economic indicators." There are three classes of indicators²:

1. *Leading indicators* signal what direction the economy could be moving in the future. Examples include housing starts and consumer/business confidence surveys.
2. *Lagging indicators* are used to confirm the directional trend of the economy. Examples include interest rates and unemployment rates.
3. *Coincident indicators* are more descriptive in nature and provide a summary of the current state of the economy. GDP and industrial production figures are included in this group.

While a robust economic analysis will use all three indicator types, leading indicators are the most valued because they can, theoretically, be used to assist in projecting future movements in the economy. Coincident indicators are useful in measuring the state of an economy at a given moment in time, while lagging indicators are mostly used to confirm if the economy is indeed following the leading indicators prediction.

This month's article is written by London Spivey (london_spivey@mines.edu), whom is pursuing a Master's degree in Mineral and Energy Economics at the Colorado School of Mines.

Leading indicators are the most valued because they can, theoretically, be used to assist in projecting future movements in the economy.

*GDP is a measure of production within a countries border. While there are many methods to measure GDP, they all add up to the same figure and simply exist to provide various perspectives. The most used calculation is $GDP = C+I+G+NX$ (consumption spending + capital investment + government spending + net exports [exports – imports]).

1. Macroeconomics definition – www.investopedia.com/terms/m/macroeconomics.asp

2. Indicators – https://www.investopedia.com/terms/e/economic_indicator.asp

Enter Dr. Copper

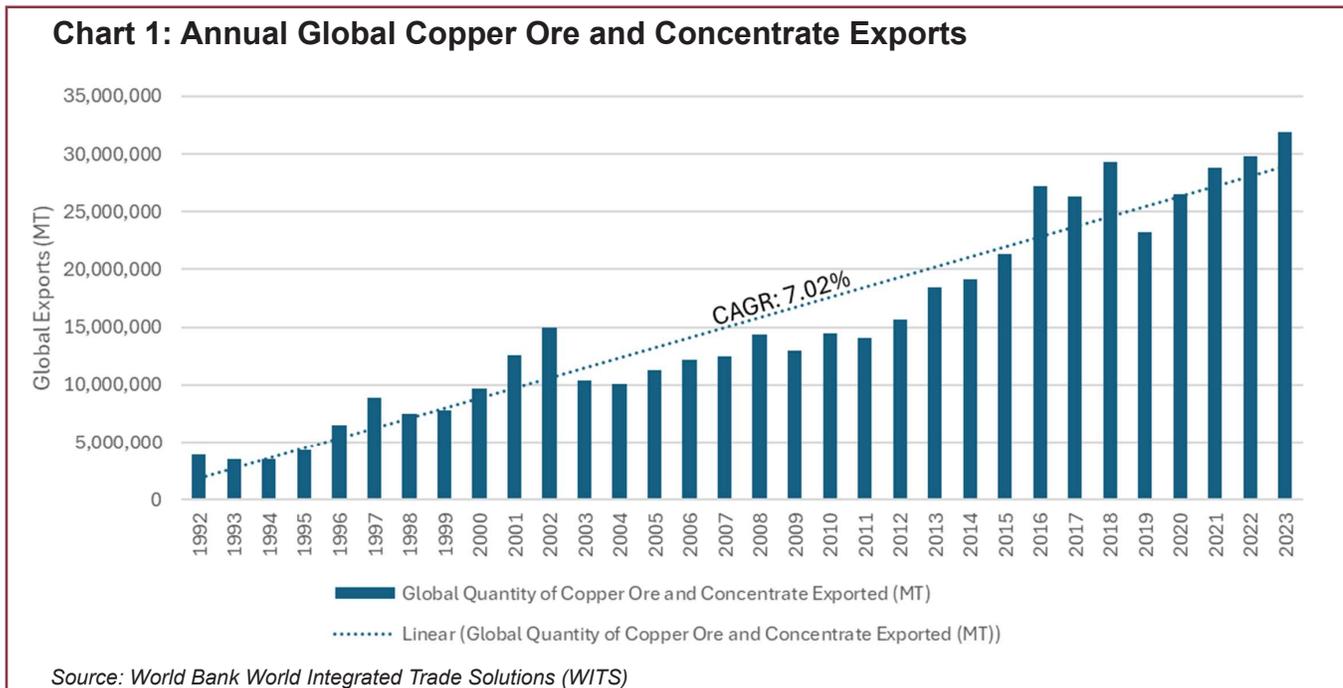
Copper has become increasingly important to economic development (see [Copper – The Most Critical Critical Mineral](#) for our analysis of this trend). As this has occurred the market for copper has become more global and a nation’s access to copper is increasingly tied to its ability to engage in economic growth. Tying together of economic potential and copper access has given rise to the nickname “Dr. Copper”, as the metal must have a Ph.D in economics to be able to predict cycles as well as it does.³ We will focus on showing how, as global copper trade has increased, copper has become a leading indicator of macroeconomic conditions across the world.

Tying together of economic potential and copper access has given rise to the nickname “Dr. Copper”, as the metal must have a Ph.D in economics to be able to predict cycles as well as it does.

The global copper trade

Chart 1 demonstrates how the global copper trade has grown from the year 1992 onward. Using data from the World Bank⁴, we can see global exports of copper ore and concentrate grew from 3.89 million metric tons in 1992 to a high of 31.9 million metric tons in 2023, at a compound annual growth rate of slightly over 7%.

Given our initial hypothesis that as the copper trade has become more global in nature it has also become a leading indicator of world economic growth, we will compare the correlation of copper prices and the GDP of various regions around the world to see how the relationship has changed over time.



3. Dr. Copper description - <https://www.investopedia.com/terms/d/doctor-copper.asp>

4. World Bank Copper Ore and Concentrate Exports - <https://wits.worldbank.org/trade/comtrade/en/country/ALL/year/2023/tradeflow/Exports/partner/WLD/product/260300#>

GDP and Copper Price Correlation

Table 1 shows the correlation between annual GDP of various geographic regions and average annual LME copper cash prices (column 2). We have additionally introduced lags that correlate current year GDP with copper prices one and two years prior, respectively (columns 3 and 4). As shown, correlations between current year GDP and copper prices are quite strongly positively correlated across regions and globally (> +80%). If copper prices are lagged by 1-year, correlations slightly strengthen (comparing column 2 to 3). In all measured regions correlations increase slightly when copper prices are lagged by 1 year (in Africa, Latin America, and the Euro area, the correlation increases to over 90% indicative of a very strong correlation). Thus, we see that the movement in copper price in any given year serves as a strong indicator of the GDP movements of the following year. Strengthening correlations does not, however, carry over to when copper prices are lagged by 2 years (column 4).

In all measured regions correlations increase slightly when copper prices are lagged by 1 year (in Africa, Latin America, and the Euro area, the correlation increases to over 90% indicative of a very strong correlation).

Table 1: Correlation Between GDP and Copper Price and Exports

Country/Region	GDP to LME Copper Price Correlation	1 Year Lag	2 Year Lag
Africa Eastern and Southern	0.894	0.922	0.884
Africa Western and Central	0.840	0.904	0.898
Central Europe and the Baltics	0.868	0.891	0.853
East Asia & Pacific	0.827	0.848	0.831
Euro area	0.884	0.916	0.866
Europe & Central Asia	0.880	0.893	0.836
European Union	0.883	0.898	0.842
Latin America & Caribbean	0.859	0.924	0.911
Middle East & North Africa	0.865	0.921	0.904
North America	0.818	0.826	0.802
OECD members	0.874	0.889	0.852
Sub-Saharan Africa	0.876	0.920	0.897
United States	0.806	0.811	0.790
World	0.864	0.890	0.863

Source: GDP from The World Bank. Prices from FactSet

Table 2: Regional GDP & Copper Price 1-Year Lagged Correlations Over Various Time Periods¹

	1992-2000	2001-2008	2009-2017	2018-2023
Africa Total	0.027	0.978	0.657	0.916
East Asia	-0.493	0.963	-0.054	0.808
Euro Area	0.469	0.929	0.474	0.673
North America	-0.509	0.959	-0.044	0.815
OECD members	-0.146	0.946	0.487	0.789
Europe and Central Asia	0.278	0.948	0.736	0.787
Latin America	-0.237	0.990	0.806	0.705
World Total	-0.110	0.967	0.386	0.839
Average	-0.090	0.960	0.431	0.791

Source: Export Volumes from WITS. Prices from FactSet

¹The years in the table correspond to GDP measured years, so introducing the lag will shift the price years back one. For example, the 1992-2000 period observes GDP from 1992 to 2000 while using prices from 1991 to 1999.

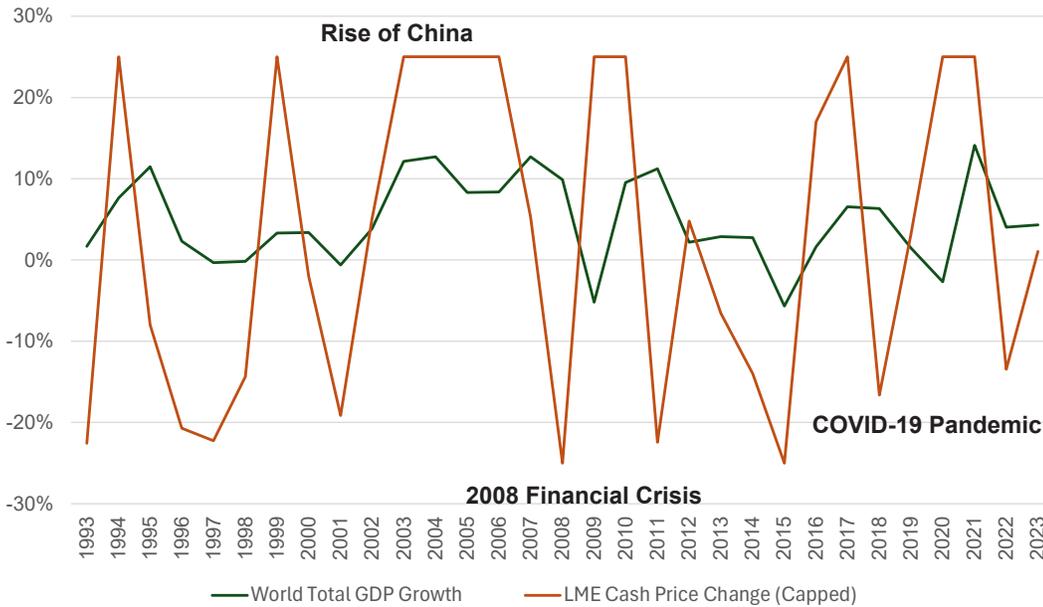
Table 2 focuses on the one-year lag in our correlation matrix and looks at major regions over various time periods. Table 2 shows that copper has gone global, the one year lagged correlation between GDP and prices across all regions has increased dramatically, going from near zero correlation in the 1990s to a very high correlation in the 2000s, though the correlation has decreased in recent years while remaining relatively strong. While the correlation has been gaining strength over time it is important to note that in the 2009-2017 period the correlation did decrease significantly, showing that solely relying on the copper price as an economic indicator is not advisable.

A visual analysis

Chart 2 plots the change in world GDP against the LME copper price. Chart 2 presents very clearly why copper is considered a leading indicator. Even a decline in world GDP from an event as unpredictable as the COVID-19 pandemic occurred after a collapse in copper prices. Chart 2 also demonstrates, as did Table 2, that strictly following indicators is not advisable. During the US “tech recession” of 2000-2001 copper prices declined 20% while world GDP was relatively unaffected by the geographically isolated event.

Copper has gone global, the one year lagged correlation between GDP and prices across all regions has increased dramatically, going from near zero correlation in the 1990s to a very high correlation in the 2000s, though the correlation has decreased in recent years while remaining relatively strong.

Chart 2: World GDP Change vs LME Copper Price Change^t



Source: Export Volumes from WITS. Prices from FactSet

^tCharting GDP growth rates against price changes is inherently difficult because prices of individual goods are much more volatile than GDP. To aid in this we placed a cap of +/- 25% on the LME Copper prices. Therefore, on Chart 2 wherever the plotted line is at 25% or -25%, that means the price or export moved by at least that much.

Concluding remarks

A common disclaimer in any financial analysis is that “past performance is no guarantee of future results.” This is true for indicators as well. Indicators function well because there is an underlying web of relationships that tie the indicators to future economic activity. These webs can be incredibly complex and while we can attempt to untangle the linkages and understand what makes the indicator worthwhile there are undoubtedly links that are unseen and maybe even unobservable. Should any of these links, observed or unobserved, break and diverge from the past relationship the result can be a false indicator. The general story for copper as an indicator is that as global aggregate economic activity becomes more driven by the tech sector, copper’s importance to the green and data revolutions ties the ability of countries to grow to their copper demand. Yet there could be many more links currently determining the link between GDP and copper prices. For example, given that copper is priced in most of its major markets in terms of the U.S. Dollar that continues to be the “world’s reserve currency”, perhaps the dollar is the true driving force, and the copper price is simply spurious. If that is the case, then the recent break down of the relationship between the dollar and copper laid out in *Copper and the U.S. Dollar Correlation* could bode ill for copper as an indicator. In short, indicators should be used in conjunction with other economic analysis and not in isolation.

The general story for copper as an indicator is that as global aggregate economic activity becomes more driven by the tech sector, copper’s importance to the green and data revolutions ties the ability of countries to grow to their copper demand.

Disclaimer

The views expressed in the research report regarding any particular company, security, industry or commodity price are the independent and personal opinions of the research analysts and their associates. Views expressed herein should not be considered as a recommendation to buy or sell nor should they be relied upon as investment advice. Past performance is not a predictor of future results. Individual investment results may vary, and all investing involves risk of loss. You are responsible for your own investment decisions. Information contained in this report is current as of the date of publication and has been obtained from third party sources believed to be reliable. Capitalight Research Inc., and its affiliates, do not make any representations regarding the accuracy, completeness or reliability of any information contained herein and does not accept any responsibility or liability for any loss or damage caused by a reader's reliance on any information contained herein. Research analysts and their associates are prohibited from trading against their investment opinion, if any has been expressed. The compensation of the research analyst and their associates are not linked directly or indirectly to their opinions or to the performance of any particular company or security. Capitalight Research Inc. has not provided any consulting, advisory, investment banking or paid-for research services to any of the companies named in this research report. The research analyst or associate do not own shares of the companies named in this research report. Capitalight Research Inc. maintains a Restricted List of securities with pending research reports. Any employees, including their spouses and dependents, that are aware of pending research reports are restricted from trading securities on the Restricted List until the research report has been fully disseminated. This research report is copyright and may not be reproduced, in whole or in part, without the written consent of Capitalight Research Inc.

Anti-Spam

You are receiving this material from Capitalight Research Inc. located at 130 King St West, Suite 1940, Toronto, Ontario M5X 2A2. Capitalight Research Inc. respects your time and your privacy. If you no longer wish us to retain and use your personal information for the purposes of distributing newsletters, reports or other commercial electronic messages, please let us know via email. For more information on our Privacy Policy please visit our website at www.CapitalightResearch.com.