Reference	Location (country, market)	Sample (product, time span, data frequency)	Methodology	Main results	Dividends
Chambers, D., & Saleuddin, R. (2020). Commodity option pricing efficiency before Black, Scholes, and Merton.	London Metal Exchange (LME)	• Commodity options, European style. • Short-dated options traded on the LME between 1921 and 1931. • All the options are at-the-money. • Daily traded prices of three-month options on copper and tin futures. • Data from Keynes • 135 option trades (40 copper + 95 tin).	• The first test computes theoretical prices for each commodity options with a known strike price and time to expiry, using BSM model with realized volatility over the life of the option. • The second test examines the degree of co-movement of the implied volatility of each option trade with both historical and realized volatility.	• The first main finding is that traders of tin and copper options in the 1920s transacted with Keynes via his broker at prices fairly close (spread of 15%) to their BSM model theoretical value. • The second main finding is that, for any changes in the option trades' theoretical values, characterized by implied volatility, were associated with changes in observable parameters (historical volatilities) and expectations (proxied by realized volatility).	No.

Moore, L., & Juh, S. Derivative pricing 60 years before Black–Scholes: evidence from the Johannesburg Stock Exchange	Johannesburg Stock Exchange (JSE).	• Warrants, American style. • Daily prices of 15 warrants from 1909 to 1922 and daily call option on 112 companies' stocks between January 1908 and May 1911. • All the data are quotes from a particular broker.	• Compute theoretical prices for each warrant and options using the BSM model (with 2 different volatilities) except for the one which had dividend, they used a binomial tree (100 step). • For call options, they used BSM model.	• For warrants, the mispricing is very different (from 2.4% to 137%, average: 23%). • 77.6% of the call options were mispriced. They find that, in general, warrant prices were surprisingly accurate in the pre-Black-Scholes era, with an average absolute percentage mispricing of 23.7% when they use a perfect-foresight measure of volatility, and a mispricing of 27.4% when they use a historical measure of volatility.	There was only one stock that paid dividends in their sample, Geduld Proprietary.

Joseph P. Kairys Jr. and Nicholas Valerio III. The Market for Equity Options in the 1870s	USA	• During the period 1873 through 1875, indicative price quotes from a particular broker, for options on about a dozen equity securities were generally published every Saturday in *The Commercial and Financial Chronicle*. These options prices were the reporting of bids and offers from a single broker to buy and sell, having 30 days to expiration. • 12 stocks with calls and puts. • Options were American style.	• For each privilege quote in the sample, two theoretical option values are calculated and used as lower and upper bounds. • The theoretical option values are calculated using the binomial model of Cox, Ross, and Rubinstein (1979) applied to a Black-Scholes (1973) economy of stock prices following a geometric Brownian motion. • The method of volatility estimation used is the extreme value method of Parkinson (1980	They find that options were persistently mispriced relative to a theoretical valuation model. They find also that trades executed at the quoted prices would have been led to a substantial portion of the contracts expiring out-of-the-money. <u>Ask quotes:</u> Focusing on the calls, 86 % of the 1,138 quoted spreads are set too high (82% for the puts). <u>Bid quotes:</u> Calls: 68% overpriced Puts: 64% overpriced	No.

Mixon. Option markets and implied volatility: Past versus present	USA	The sample is the same as the study of Kayris and Valerio. Mixon added 5 more call options at the sample.	Mixon has made few regressions to demonstrates in which way the pricing behavior of the equity option market has changed over time.	The analysis in this paper demonstrates that equity option markets displayed precisely the same empirical regularities in the nineteenth century as they do in the twenty-first century. One the less, markets have changed in some ways, and the analysis quantifies this evolution. Implied volatility moves more than it used to in response to realized volatility shocks, and the general level of option prices has declined toward levels consistent with Black-Scholes. The major change in pricing is the sharp decline in implied volatility relative to realized volatility	Yes.