

APPENDIX B

TABLE B1
Model Nomenclature

Term	Definition
Barnett Shale	Shale gas producing basin located in north central Texas
BCF	Billion cubic feet; large scale measure for natural gas reserves
Bonus	A lump-sum, up-front payment made to the lessor by the lessee
C	Cost of completing one well (dollars)
δ	Convenience yield (nonpecuniary return) received by the owner of a developed resource (percent)
Drilling rig	Machinery used to construct an oil or gas well
Dry gas	Natural gas that contains few natural gas liquids (propane etc.)
E	Extension to primary term achieved by establishing production (months)
EUR	Volume of estimated ultimate recovery that will be produced over the life of a single well
Express covenant to develop	A provision of the lease that requires continuous drilling, development, and production without delay
Fayetteville Shale	Shale gas producing basin located in central Arkansas
Habendum clause	A provision of the lease that permits lessee to hold by production
Haynesville Shale	Shale gas producing basin stretching from eastern Texas to western Louisiana
HBP	Hold by production, when a lease is extended beyond the primary term
Implied covenant to develop	A legal doctrine that many courts have applied to prevent an operator from postponing indefinitely development of the leased acreage
K	Unit cost of developing reserves: $K = C/EUR$ (dollars/thousand cubic feet)
Lessee	The operator who acquires rights to develop and produce minerals owned by another
Lessor	The mineral owner who conveys the right to develop and produce to an operator in exchange for a bonus payment and royalty interest

Term	Definition
Marcellus Shale	Shale gas producing basin located in the Appalachian region of Pennsylvania, West Virginia, Ohio, and New York
MCF	Thousand cubic feet; the standard volumetric measure of natural gas reserves
N	Number of wells permitted to be drilled on the lease or spacing unit determined by state regulations
Natural gas liquids	Components of a natural gas deposit that convert to and are marketed as liquid petroleum products when removed from the earth, due to changes in temperature and pressure
Pooling	Combining smaller leases into one larger tract, subject to well spacing regulations
Pugh clause	A provision of the lease that requires relinquishment of undeveloped and nonunitized portions of a tract at the end of the primary term
r	Risk-free rate of interest (percent)
S	In situ value of one unit of developed reserves (dollars/thousand cubic feet)
σ	Volatility of natural gas price
Section	An area equal to 640 acres (1 square mile)
Shale basin	An area containing a continuous bed of petroleum source rock of common geological heritage
Sweet spot	The area within a shale basin that exhibits the highest well productivity
T	Primary term of the lease, during which the operator must either establish production or relinquish all rights (months)
V	Value of a lease without the HBP option
V^+	Value of a lease with the HBP option
Well spacing regulations	State regulations that determine how many wells may be drilled within a specific tract
Well spacing unit	The prescribed area of development governed by well spacing regulations (typically 1–2 square miles)
Woodford-Arkoma Shale	Shale gas producing basin located in southeastern Oklahoma
