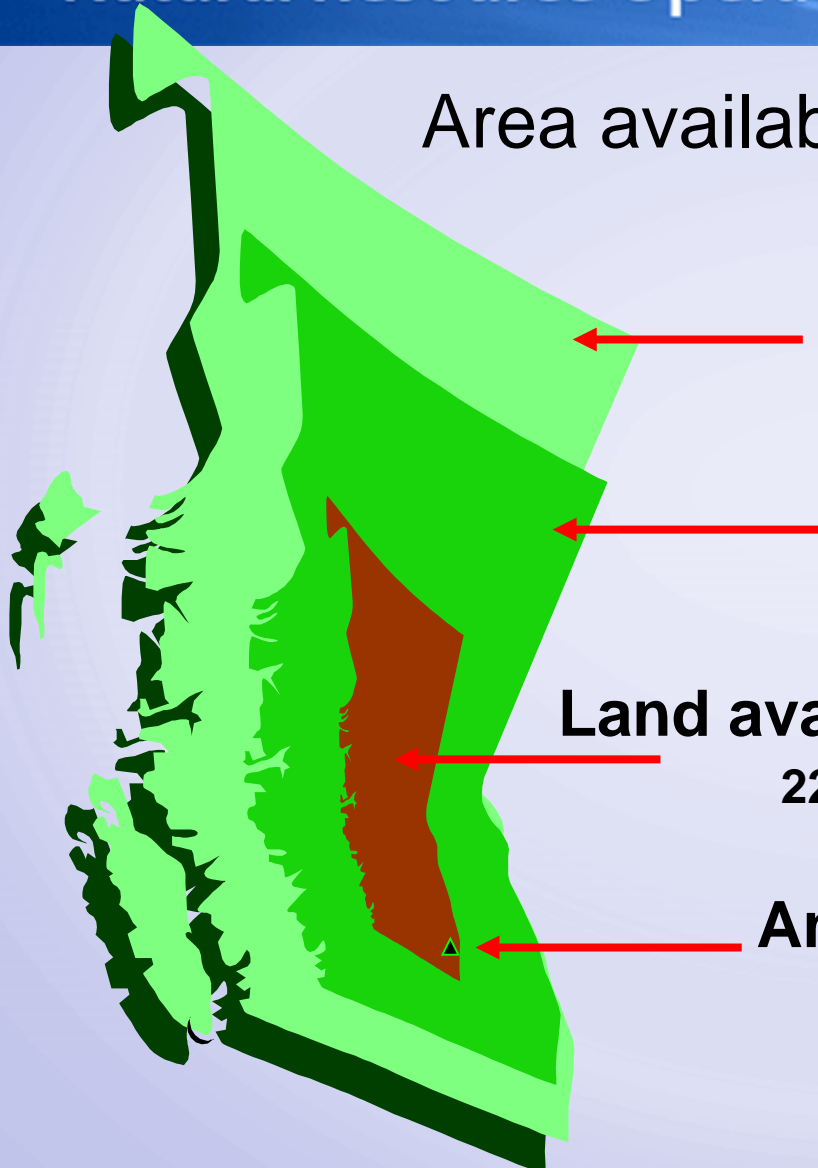




# **TIMBER PRICING IN BRITISH COLUMBIA**

David Grypma  
BC Ministry of FLNRORD  
Timber Pricing Branch



**Area available for timber harvesting**

**Total area of BC**  
95 million hectares

**Forested land base**  
56 million hectares

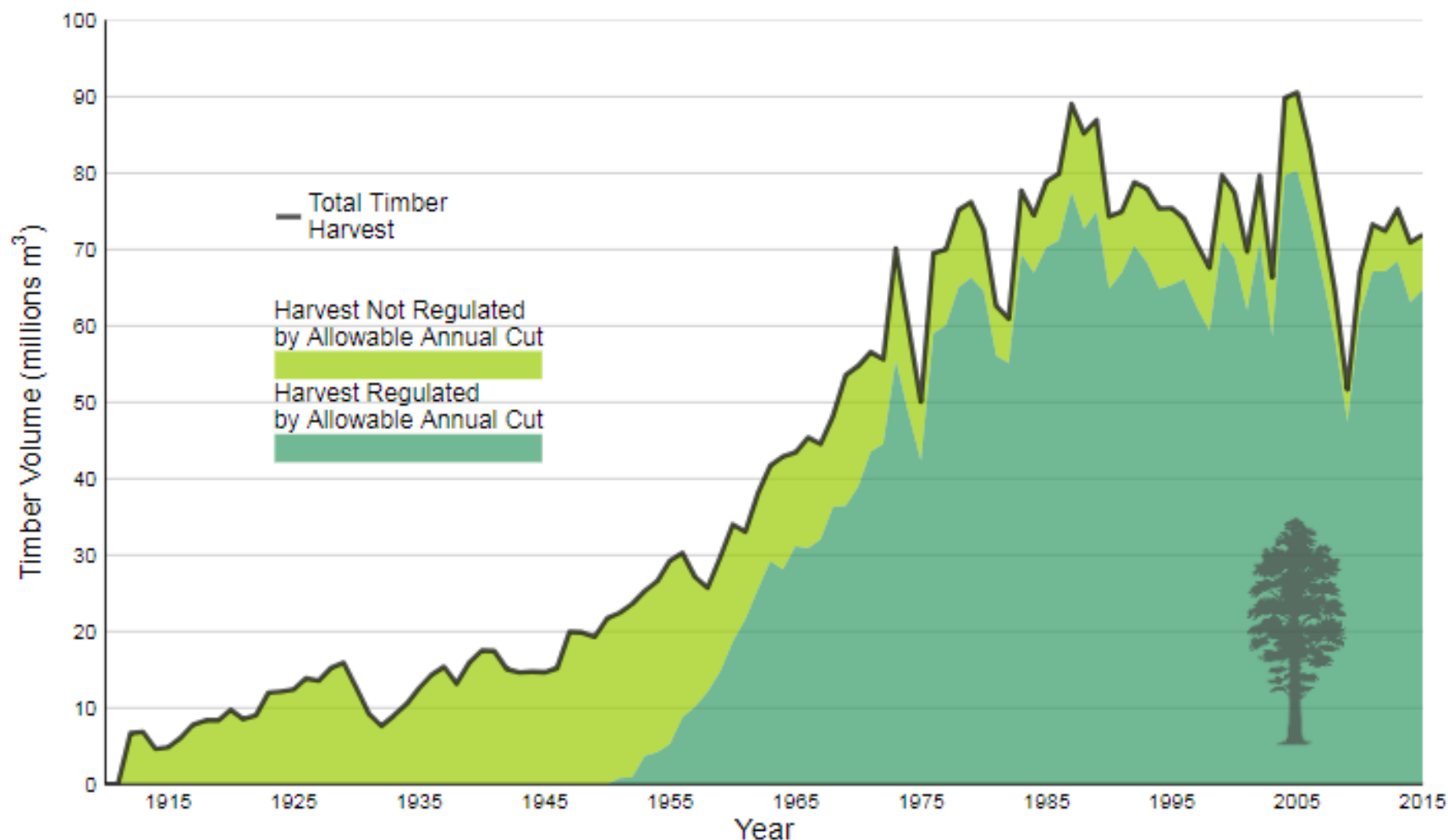
**Land available for timber harvesting**  
22 million hectares

**Annual area harvested**  
About 200,000 hectares

# Ministry of Forests, Lands and Natural Resource Operations



## How Much Timber Is Harvested Annually?





- **How can Government collect economic rent on standing timber that accurately reflects real business decisions and markets?**
- In theory, rent can be determined starting with price of an end product (e.g. lumber, logs, standing timber) and backing out appropriate costs. These costs include enough
  - Example 1: Lumber price – processing costs – harvesting costs – forest management costs = rent (“stumpage”)
  - Example 2: Log price – harvesting costs – forest management costs = rent
  - **Example 3: Standing timber price – forest management costs = rent**

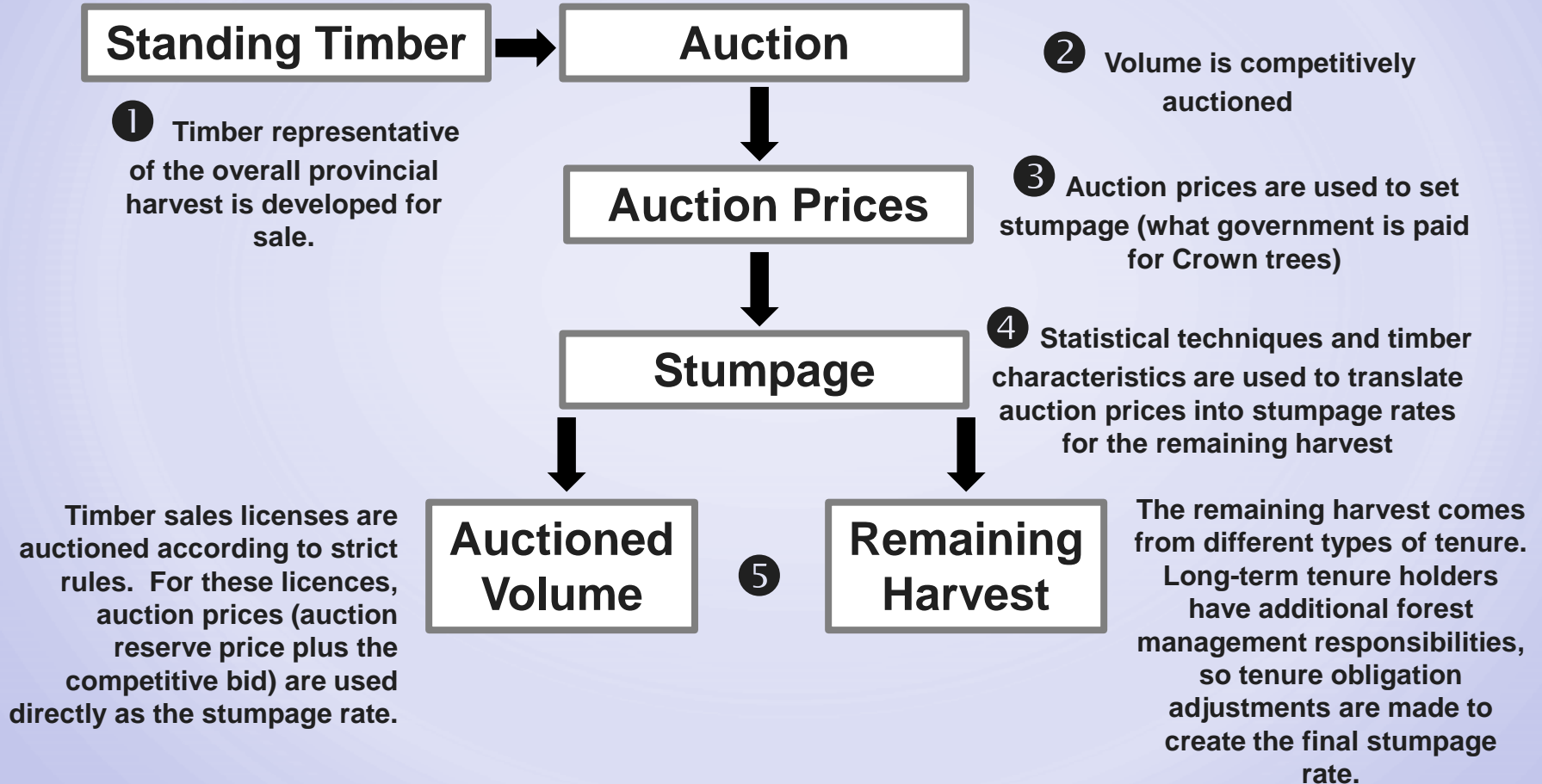


# Stumpage = EWB – TOA

EWB: estimated winning bid, using a formula derived from auctions of standing timber

TOA: tenure obligation adjustments, recognition of costs and obligations borne by tenured licensees that bidders do not face, i.e. not “built in to the bids”

# Architecture of MPS





# BCTS

- BC Timber Sales
  - Auctions 20% of timber to provide market evidence in support of pricing the remaining 80%
  - Auctions TSLs (cutting permits)
  - Business decisions regarding which tracts to auction
  - Forest management



# BCTS Requirements for Accurate Stumpage Rates

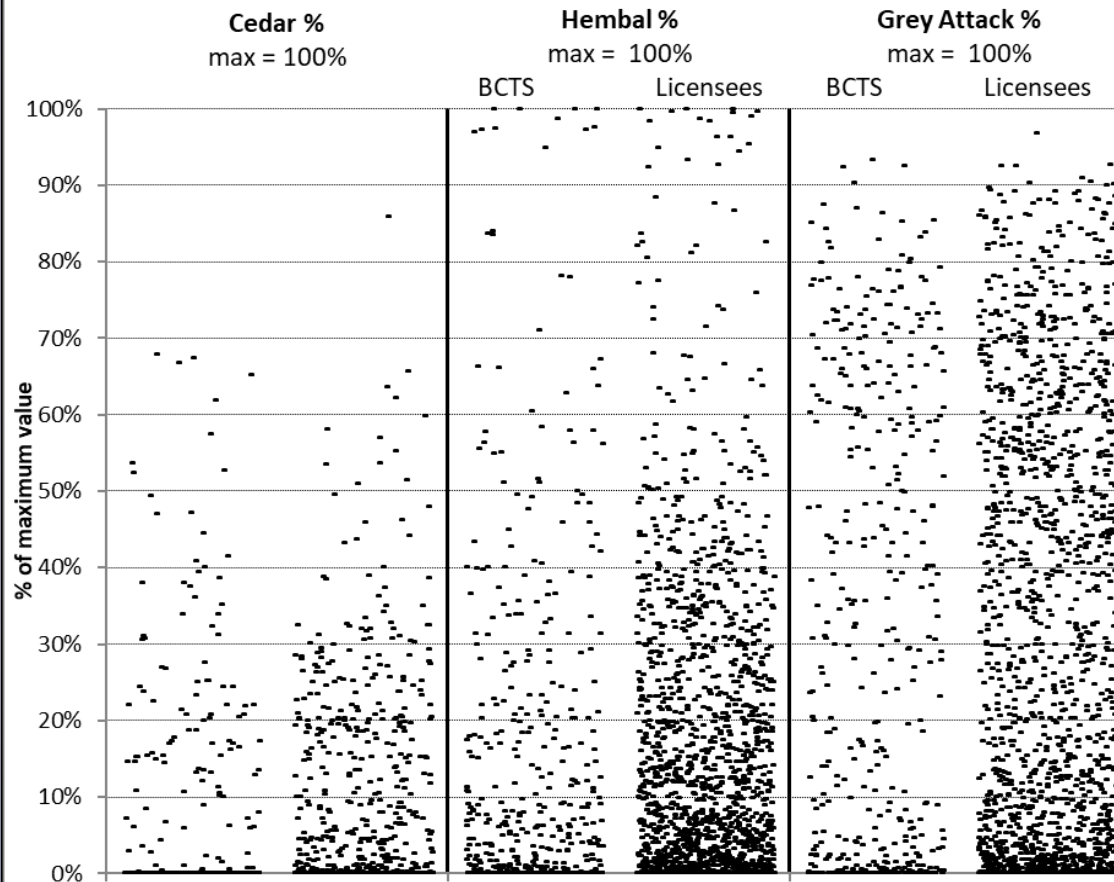
- Sufficient volume transacted under adequate competition
  - Auction advertised
  - Preliminary appraisal
  - Upset price
  - First price sealed bid
- Translate winning bids into stumpage rates
  - Representative auction sample (Athey: 20%)
  - Alignment of terms and conditions of harvest rights in long-term tenures and auction sales (TOAs)



# Ministry of Forests, Lands and Natural Resource Operations



## Interior MPS Representativeness Marks With Harvest





# Econometrics

- Dataset consisting of winning bid and characteristics of each TSL (cutting permits)
  - Used to be latest 5 years, now includes previous 10 years
- Well-designed system = simple econometrics
- OLS

# Ministry of Forests, Lands and Natural Resource Operations



## Final Model For CMPS December 15 2017



Dependent Variable: WB\*148/CPI  
 Method: Least Squares  
 Date: 10/19/17 Time: 11:56  
 Sample: 1914 IF IN\_11\_YEAR=1  
 Included observations: 648

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-56.02804	4.615821	-12.13826	0.0000
NB	2.812062	0.201547	13.95238	0.0000
ALP_DOM*148/CPI	0.620820	0.052658	11.78967	0.0000
CEDAR_LUMBER_AMV*CEDAR*148/CPI	0.040808	0.005340	7.642234	0.0000
FIR_LUMBER_AMV*FIR*148/CPI	0.027080	0.008343	3.245966	0.0012
HEMLOCK_LUMBER_AMV*HEMLOCK*148/ CPI	0.014032	0.007226	1.941881	0.0526
CYPRESS	36.26700	8.234571	4.404237	0.0000
SLOPE*(1-HELI)	-0.266355	0.038034	-7.003142	0.0000
HELI_LAND	-43.11316	2.971447	-14.50915	0.0000
HELI_WATER	-34.50390	4.219481	-8.177287	0.0000
VPH/1000	20.62512	2.750299	7.499228	0.0000
LOCATION	-0.076688	0.012086	-6.344979	0.0000
(FIR)*SG	7.578621	3.311934	2.288277	0.0225
GAMB400_DUM	-7.239376	1.966462	-3.681423	0.0003
CRUISE_GRADES	6.444171	1.470747	4.381563	0.0000
ISOLATED	-7.744018	1.239696	-6.246706	0.0000
LUMPSUM	-5.622915	1.350102	-4.164807	0.0000
EXP_EXP_SHARE_12MR*(1-CEDAR- CYPRESS)	31.30552	6.304359	4.965695	0.0000
TOT_COAST_HARV_12MR	0.592793	0.197624	2.999592	0.0028

R-squared	0.790966	Mean dependent var	40.33850
Adjusted R-squared	0.784984	S.D. dependent var	23.51814

# Ministry of Forests, Lands and Natural Resource Operations



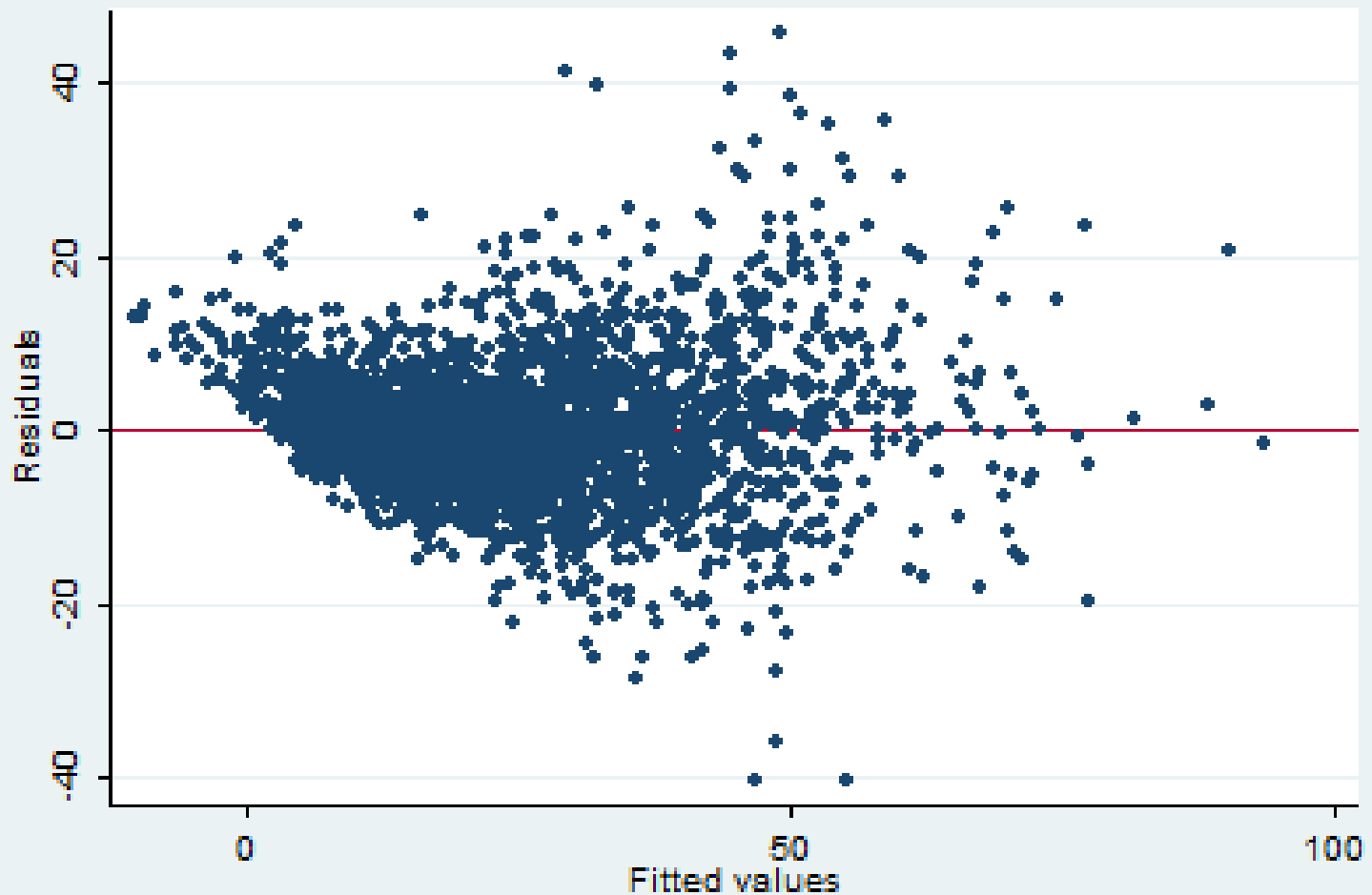
## IMPS 2017 WB Regression

Dependent Variable: RBID  
 Method: Least Squares  
 Date: 08/21/17 Time: 15:18  
 Sample: 1 3063 IF LIVE\_IN=1  
 Included observations: 2580

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.114657	4.521746	1.352278	0.1764
LOG(NB)	5.035903	0.252762	19.92352	0.0000
RSPI	0.308813	0.010206	30.25862	0.0000
CE	15.01446	4.123095	3.641550	0.0003
CE*CEDAR_DECAY	-105.8616	17.15892	-6.169482	0.0000
HE	-13.31886	1.438883	-9.256389	0.0000
BA+2*(BA-0.5)*(BA>.5)	-4.619893	1.121604	-4.119007	0.0000
LA+YE	-6.925268	3.164191	-2.188638	0.0287
(FI+YE)*DRY_OR_DRM_DMH	-4.760375	1.677773	-2.837317	0.0046
CABLE*(AWARD_YEAR<=2010)	-2.732014	1.629285	-1.676818	0.0937
CABLE*(AWARD_YEAR>=2011)	-18.05816	1.296621	-13.92709	0.0000
LOG(CVOL/1000)	1.411551	0.211393	6.677390	0.0000
DECAY	-14.46983	4.684229	-3.089052	0.0020
FIRE	-10.37213	2.851831	-3.637009	0.0003
LOG(VPT)	6.858243	0.510997	13.42129	0.0000
LOG(VPH)	1.324141	0.602558	2.197531	0.0281
CYCLE+.5*CYCLE_6PLUS	-1.594167	0.103843	-15.35166	0.0000
Z9	-7.337254	0.679560	-10.79707	0.0000
GREY*((AWARD_YEAR-2008)*(AWARD_YEAR>=2008)+3*(AWARD_YEAR-2015)*(AWARD_YEAR>=2015))*CB*D_RG35	-0.975832	0.138906	-7.025132	0.0000
CB*(1-D_RG35)	-5.409600	0.687052	-7.873639	0.0000
CB*D_RG35	-5.764556	0.550225	-10.47673	0.0000
DECKED	56.92729	11.89062	4.787580	0.0000
GS*GS_SLOPE_SQ_15_50	-0.006408	0.001517	-4.225500	0.0000
FX_3_0	-24.88612	2.371598	-10.49340	0.0000
TOT_HARV_12MR	0.398547	0.035261	11.30268	0.0000
NET_BLOWDOWN	-8.172313	3.740040	-2.185087	0.0290
NET_DECID*(CB+DECID_BONUS*SB)	-10.55908	2.549222	-4.142080	0.0000
D2016	2.256344	0.632368	3.568087	0.0004
R-squared	0.741553	Mean dependent var	23.52541	
Adjusted R-squared	0.738819	S.D. dependent var	14.62645	



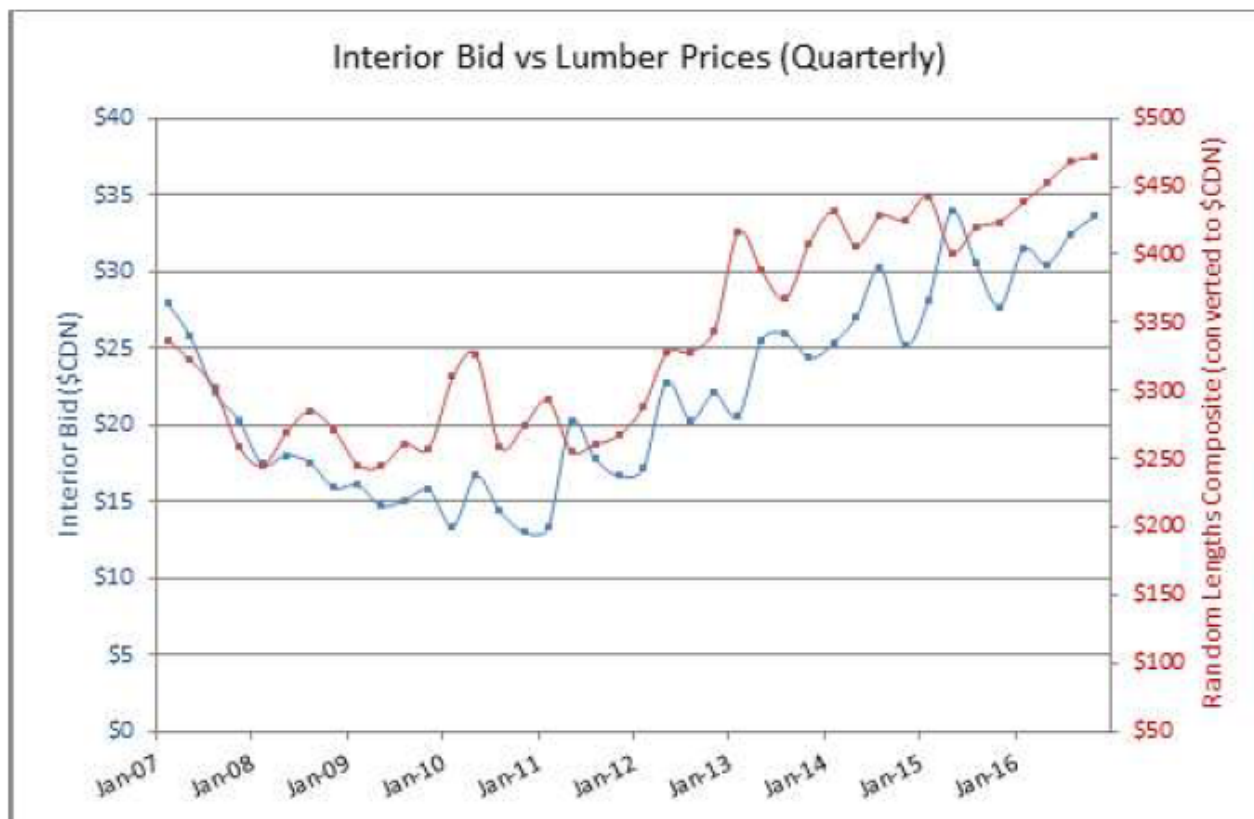
2017 IMPS Residuals vs Fitted Values



# Ministry of Forests, Lands and Natural Resource Operations



**Chart 4**  
**Average Winning Bids in Relation to US Lumber Prices**



Adjusted R2 = 0.65

Explanatory Notes:

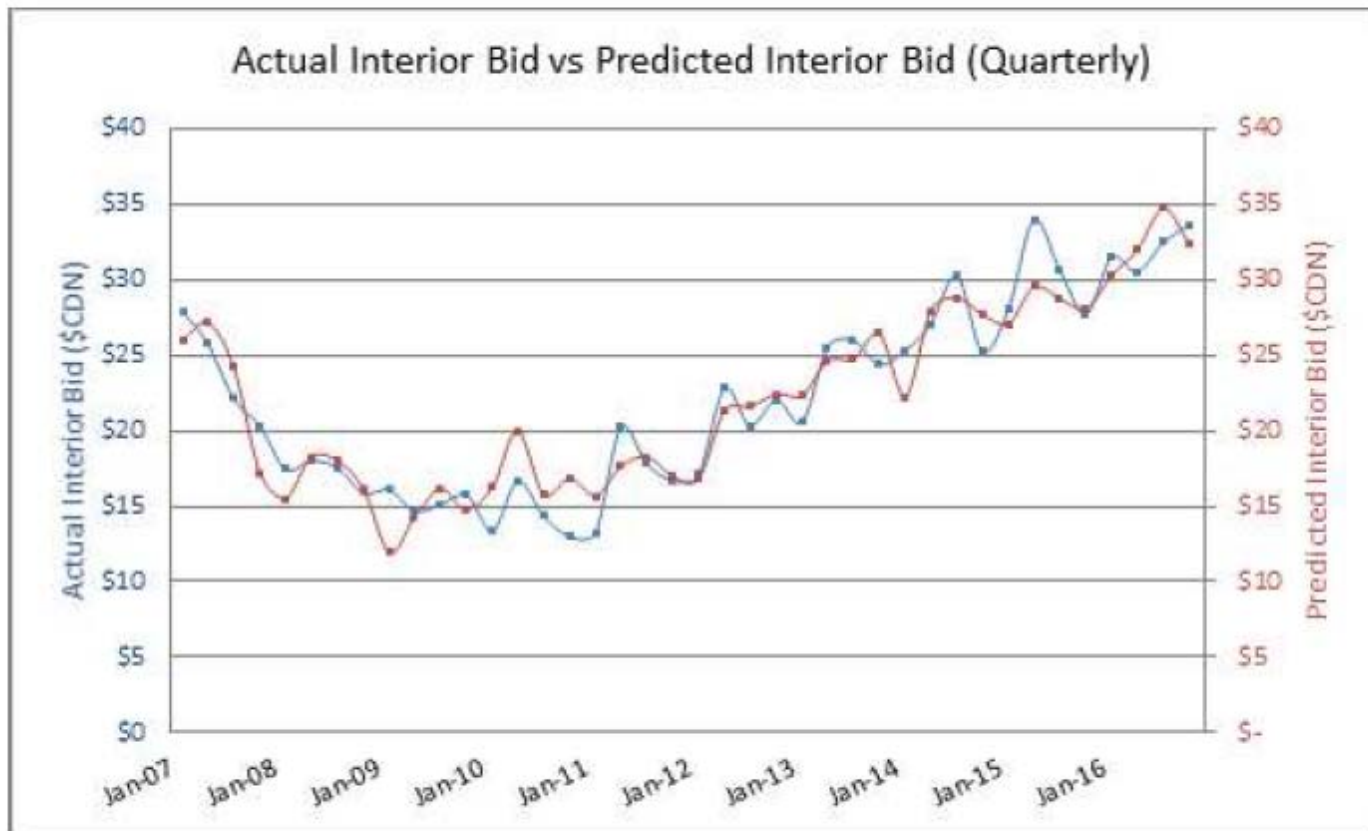
Random Lengths composite lumber price (converted to \$CDN)

Average winning bid on BCTS competitive auction sales conducted in each quarter

# Ministry of Forests, Lands and Natural Resource Operations



**Chart 5**  
**Average Winning Bid on BCTS Sales, Interior, 2008 – 2016**  
**Actual vs Predicted**



Adjusted R2 = 0.88



## **Tenure Obligation Adjustments (TOAs)**

- TOAs recognize management activities that tenure holders have and BCTS bidders do not
- In other words, they recognize costs that are not “built into the bids”
- Coast and Interior have their own TOAs, though the underlying logic is the same
- Major categories of TOAs are:
  - planning and layout
  - major road building
  - road management
  - silviculture





# MPS Update Procedures

- Stumpage rates are updated quarterly using the MPS equation and current product prices
- MPS equations are updated regularly with the latest 5 years of auction data
  - **Coast**
    - Updates have been “periodic” and moving towards annual
    - Updated June 1, 2007, January 15, 2009, July 1, 2012, January 1, 2014 and March 1, 2016
  - **Interior**
    - Regular annual updates since July 1, 2006
    - The latest IMPS update was delayed 3 months due uncertainty around the status of the government in the months following the election



# Resources

- Appraisal Manuals
  - Coast: <https://www2.gov.bc.ca/gov/content/industry/forestry/competitive-forest-industry/timber-pricing/coast-timber-pricing/coast-appraisal-manual>
  - Interior: <https://www2.gov.bc.ca/gov/content/industry/forestry/competitive-forest-industry/timber-pricing/interior-timber-pricing/interior-appraisal-manual>
- Timber Pricing Branch Economists:
  - [David.grypma@gov.bc.ca](mailto:David.grypma@gov.bc.ca)
  - [Steve.fletcher@gov.bc.ca](mailto:Steve.fletcher@gov.bc.ca)