Session 4 :
Valuation in practice

Valuating IP and understanding how to use it
Discussions and Experience Sharing

Ashley Stevens (to present), Richard Cahoon(to discuss)

Who's Speaking

Ashley Stevens

PhD, CLP, RTTP

Dr. Stevens is a biotech entrepreneur and technology commercialization expert. He co-founded Genmap, Inc. and Kytogenics, Inc., bringing academic innovations to market. He later led technology transfer at Dana-Farber Cancer Center and Boston University, where he helped launch 55 startups.

Affiliation

- Past President Association of University Technology Managers, USA(AUTM)
- Head of Tech Transfer for Boston University
- President Focus IP Group, LLC

Who's Speaking

Richard Cahoon
PhD

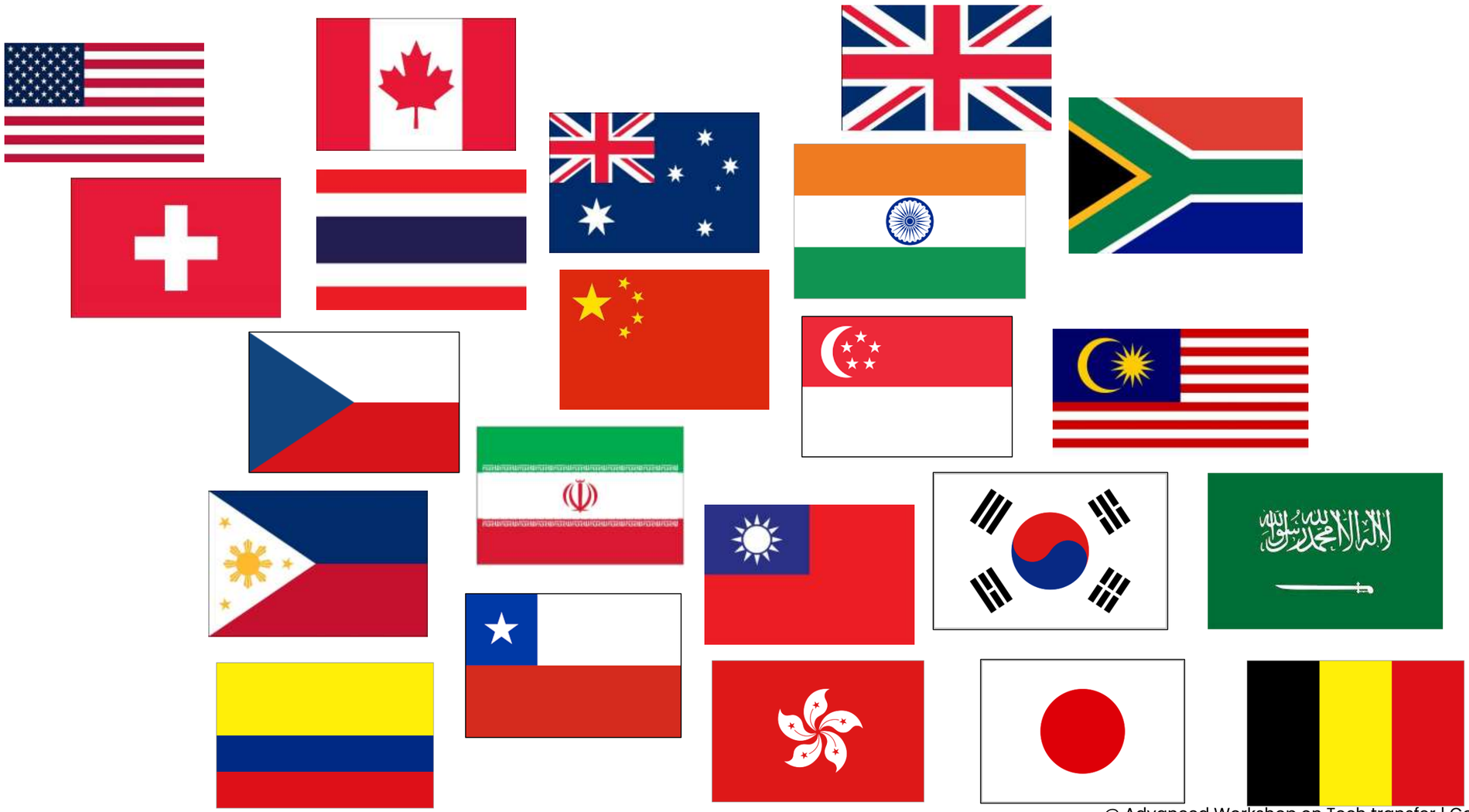
Richard Cahoon, Adjunct Professor at Cornell University, specializes in technology transfer, IP management, and commercialization. With over 30 years of experience, he has advised governments, universities, and global organizations on innovation ecosystems, IP strategy, venture creation, and technology-driven economic development in over 25 countries.

Affiliation

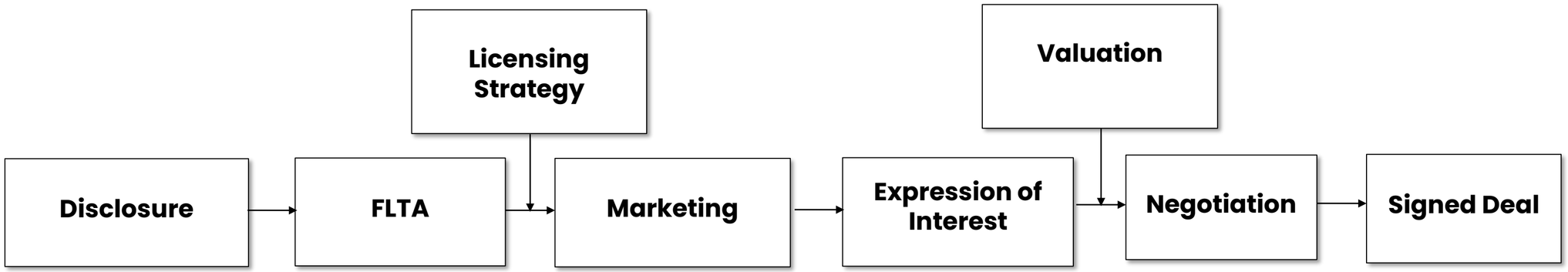
- Past Association of University Technology Managers, USA (AUTM) Board of Directors
- President, BioProperty Strategy Group, Inc.
- Head of Tech Transfer, Cornell University

Valuating IP and understanding how to use it

Ashley Stevens



The Technology Transfer Process



Agenda

- Valuation vs. Pricing
- How value is extracted in a license
- Risk and Value
- Valuation Methodologies
  - Cost
  - Rules of Thumb
  - Industry Standards – Comparables
  - Discounted Cash Flow / Net Present Value

As You Start off on a License Negotiation...

- What is the Product?
  - New product
  - New market
  - Disruptive?
- How is value added?
  - New use
  - New product feature
  - Lower cost
  - Blocking competition?
- What is the business model for revenue generation?
- What is the market and competition (existing and emerging)?

As You Start off on a License Negotiation...

- What and how much value does your IP bring to the business?
  - Materials,
  - Software
  - Know-how
- What kind of IP asset(s) do you have?
- How is the business going to be financed?
- Is it an existing licensee or a new venture?

What's the Single Most Important Factor that Determines the Value of Your IP?

- The name of the licensee!
  - Are they committed?
  - Capable?
  - Adequately resourced?

Valuation

- Various techniques
- Different answers
- An opinion

Pricing

- A negotiation
- One outcome
- A commitment

Valuation

- With a valuation basis

Pricing

- You negotiate the bases

Valuation

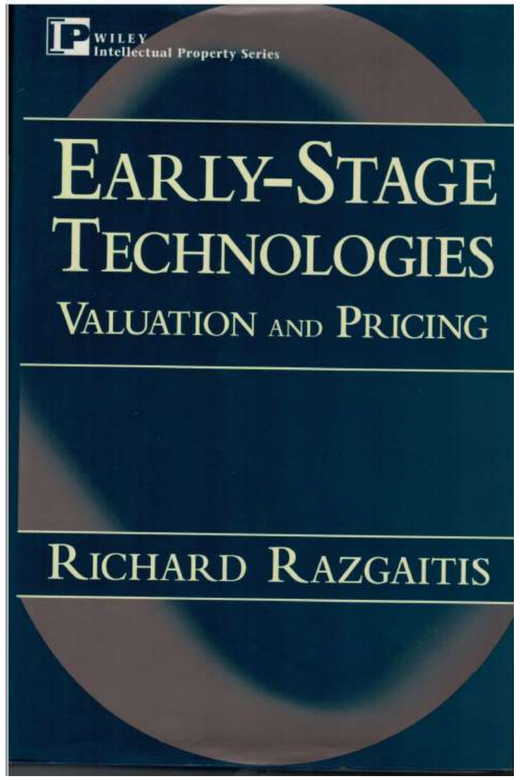
- With a valuation basis
- Without a valuation basis

Pricing

- You negotiate the bases
- You negotiate from emotions

When Is Technology Valued?

- Retrospectively
  - By litigators
  - Discovery to obtain all relevant information
  - Value established at a point in time
  - Adversarial -- outcome imposed judicially
- Prospectively
  - By deal makers
  - Asymmetry of information
    - University understands technology
    - Company knows the market
  - Value extracted over time
  - Must be win-win



First Edition -- 1999

What Do we Mean by a “Valuation”

- A written analysis of what we believe the value of a technology to be
- Prepared to:
  - Give it to the other side
  - Identify the sources of the data
  - Discuss the data
  - Modify based on discussions with the other side
    - Data
    - Valuation methodology used

What Do we Mean by a “License Valuation”

- Constructing the various financial elements of a proposed license
  - Upfront payments
  - Ongoing pre-commercial payments
    - Patent costs
    - Milestone payments
    - Annual Minimum Royalties
    - Research support
  - Sublicense income sharing
  - Earned royalties or sales/profit sharing
- **i.e., the Term Sheet**

What do we Mean by the "Value" of a Deal?

AMGEN ABOUT SCIENCE PRODUCTS RESPONSIBILITY STORIES Newsroom Partners Investors Careers

Amgen and Generate Biomedicines Announce Multi-Target, Multi-Modality Research Collaboration Agreement

Companies Partner to Leverage Generate's Machine Learning-Enabled Technology Platform to Discover and Create Protein Therapeutics for Patients

THOUSAND OAKS, Calif. & CAMBRIDGE, Mass.--(BUSINESS WIRE)--Jan. 6, 2022-- Amgen (NASDAQ: AMGN) and Generate Biomedicines today announced a research collaboration agreement to discover and create protein therapeutics for five clinical targets across several therapeutic areas and multiple modalities. As part of the research collaboration, Amgen will pay $50 million in upfront funding for the initial five programs with a potential transaction value of $1.9 billion plus future royalties, and will have the option to nominate up to five additional programs, at additional cost. For each program, Amgen will pay up to $370 million in future milestones and royalties up to low double digits. Amgen will also participate in a future financing round for Generate. Additional terms were not disclosed.

This press release features multimedia. View the full release here: https://www.businesswire.com/news/home/20220106005262/en/

"We are now at a scientific hinge point, where computational approaches can advance our knowledge of biology and further drive our ability to design the right molecule for some of the most challenging targets," said David M. Reese, M.D., executive vice president of Research and Development at Amgen. "We believe Generate Biomedicine's integrated in silico design and wet lab capabilities combined with Amgen's strength in protein engineering can accelerate our drug discovery efforts, generating novel protein sequences with optimal therapeutic properties."

Recognizing the unique discovery challenges in multispecific drug discovery, Amgen has invested over the last decade in the marriage of wet lab high throughput automation and dry lab computational biology. Amgen's generative biology strategy has led to the building of a Digital Biologics Discovery group, to harness the Company's pioneering strength in biology, automation, and protein engineering. The goal of generative biology at Amgen is to take this experience and expertise in biologics combined with emerging sequence-based drug design technologies to deliver complex multispecific medicines against a variety of difficult-to-treat diseases. Combining Amgen's biologics drug discovery expertise with the power of Generate Biomedicines Artificial Intelligence (AI) platform provides the opportunity to further facilitate multispecific drug design by shaving time off discovery timelines and generating potential lead molecules that have predictable manufacturability and clinical behavior.

Generate Biomedicines is pioneering the field of generative biology – a revolutionary approach to drug discovery and development that leverages machine learning and AI to program novel protein therapeutics. The company's machine learning algorithms analyze hundreds of millions of known proteins, looking for statistical patterns linking amino acid sequence, structure and function, and its technology platform has been enhanced by closed-loop learning on tens of thousands of computationally generated and broadly experimental characterized

Risk

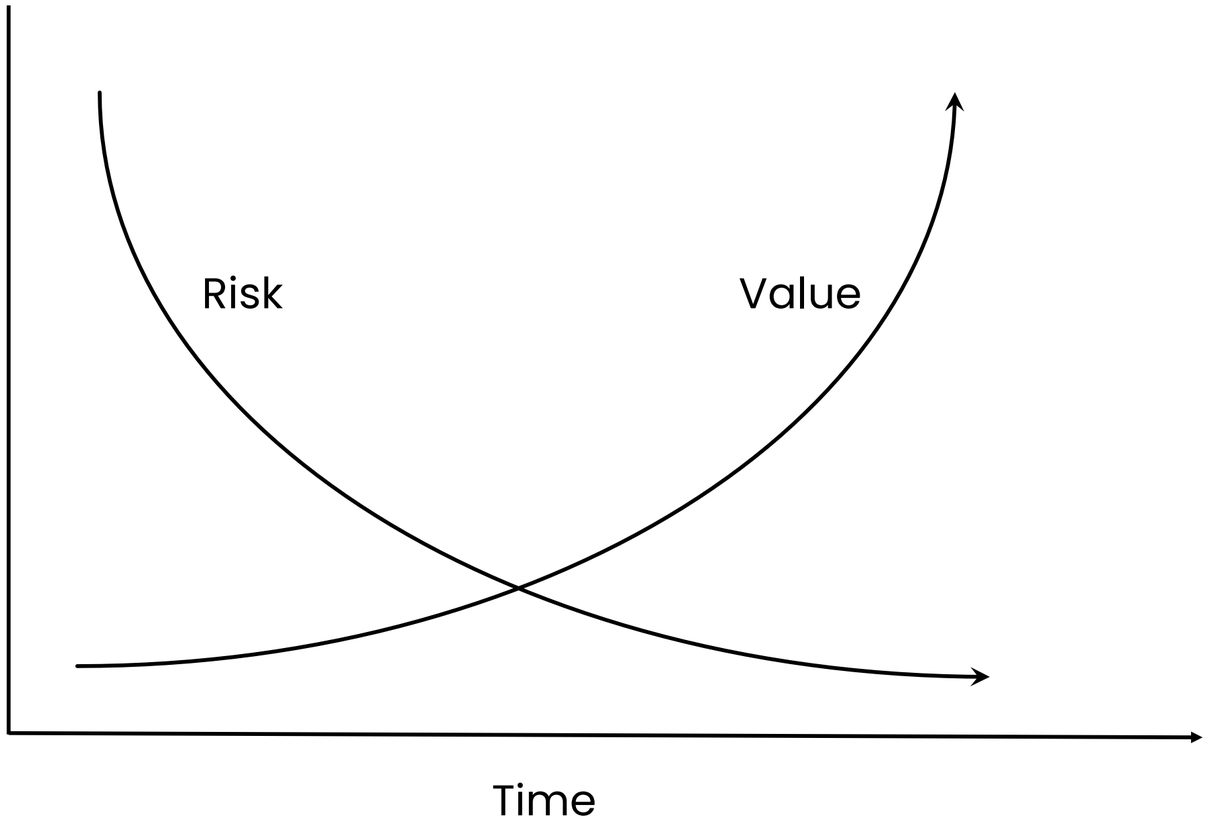
Types of Risk

- R&D risk
  - FDA risk
- Standards risk
- Manufacturability risk
- Marketing risk
- Competitive risk
- Legal risk
  - Patent risk

<u>Overall</u>

- I in 10,000 drug candidates makes it to FDA approval
- 1 in 3,000 raw ideas make it to market
- 1/3rd to 2/3rd of new product launches fail to recoup their investment

Value vs. Risk



A Fundamental Principle of License Valuation

- We probably shouldn't even **TRY** to get paid upfront in full
- Our job is to **EXTRACT** the value over time
  - Share in the growth in value

Example:Gatorade

- In 1963, Robert Cade of U. FL offered Stokely van Camp the rights* for $1 million
- Stokely van Camp declined
  - Said the test market would cost $1 million, paying Cade $1 million would double their financial risk
  - Offered to pay royalties
- To date, Stokely / Quaker / Pepsi have paid ~$2 billion in royalties
  - UFL gets 20%
  - Cade Trust gets 80%

* Rights consisted of patent applications, trade secret formula and **trademark**

Where is Value Extracted in a License?

- Upfront fee
- Ongoing pre-commercial payments
  - Patent costs
  - Milestone payments
  - Annual Minimum Royalties
- Research collaboration and support
- Sublicense income sharing
- Earned royalties

Royalty Payments

- Three basic types of payment:
  - Fixed lump sum payments
    - Single payments we get as long as the license is in effect
      - Upfront fee, annual maintenance fee, annual minimum royalties
  - Contingent lump sum payments
    - Single payments we get if certain things happen
      - Patent milestones, development milestones, sales milestones, equity liquidation, sublicense payments
  - Share the **increase in value** of the technology as it's developed
  - Running royalties
    - Payments that depend on the **extent** of licensee's use of the licensed technology
- Some payments are made pre-commercialization, some after

Upfront Payments

- Cash fee
  - Includes sunk patent costs
  - Reflects the initial value of the technology being transferred
    - Typically relatively low for academic technologies
  - A NewCo may only be able to pay in stock

Ongoing Pre-Commercial Payments

- Patent costs
- Milestone payments
  - Reflects increase in value of technology to licensee as they make progress
    - Common with life sciences inventions
    - Clinical development milestones
    - Patent milestones
    - Sales milestones
- Annual Minimum Royalties
  - Due diligence mechanism
    - Typically escalate substantially after 3 or so years
  - More common with physical sciences inventions

Sublicense Income Sharing

- Really important – with a start-up, this may be where the real value is created
- Challenge is that this is being negotiated years before the sublicense happens
  - Parties don't know how the sublicense will be structured
- University's objective will be to ensure that the licensee can't game the system by structuring the sublicense to minimize what it pays the university
  - Solution: University gets a piece of every payment that the licensee gets from the sublicensee

You will pay me every which way there is

Louis P. Berneman

- Exclusions for items for which there is a deliverable, and are documented in itemized accounts:
  - Research support payments
  - Purchases of equity

Sublicense Income Sharing

- Three models:
  1. Pass Through
     - University gets same running royalty on sublicensee's sales, as if the licensee sold the product; plus
     - A set percentage of every payment received other than running royalties (sometimes termed "non-royalty income")
  2. Allocation
     - University gets a set % of every payment the licensee gets from the sublicensee
       - Including running royalties
  3. Tiered Allocation
     - University gets a lower % of payments received from sublicensee, before commercialization
     - University gets a higher % of running royalties after commercialization
- Percentages may be based on timing of sub-licensing after license execution (e.g. year 1-25%, year 2-20%, year 3-15%)
  - Or stage of clinical development (i.e., licensee investment)

An Example – mRNA Vaccines

- Aka Moderna and Pfizer / BioNTech
- Key enabling technology is the 2005 Weissman / Karikó
  - uridine ➔ pseudouridine
  - cytidine ➔ 5-methylcytidineone
  - substitution technology
  - Penn filed patents in 2006
- Founded RNARx in 2007
  - Got $97,396 SBIR
    - Got further $900,000 SBIR
    - Ceased operations in 2013
  - Didn't license the Penn patents
  - Penn licensed Cellscript / mRNA Ribotherapeutics in Wisconsin
    - $300,000 upfront
  - mRNA Ribotherapeutics sublicensed Moderna and BioNTech

An Example – mRNA Vaccines

- License terms

	Moderna	BioNTech
Upfront	$75 million	
Milestones	$26 million	$26 million
Running royalty rate	3.5%	Low-to-mid single digits

- Moderna paid $641 million in 2021
  - Pfizer's sales were ~2x Moderna's
  - Total royalties ~$2 billion
- Penn's royalty income:
  - 2020 $30.6
  - 2021 $310.2
  - 2022$1,258.6
- But could it have been $2 billion?

Running Royalties

- Aka “Earned Royalties”
- The main post-commercialization economic component of the license
  - Biggest long term impact if the product is successful
- An equation:

  Royalty payments = Royalty base * Royalty rate
  - Payments are made for the Royalty Term

Royalty Base

- Measure of the **extent** of licensee's return from using the technology
  - Number of units sold
  - Sales
  - Profits
    - Define very, very carefully
      - Gross Profits / Net Profits / Profits after taxes
    - Very difficult (and expensive!) to audit
- Most common is "Net Sales"
  - Gross Sales less either
    - Standard deductions
      - Shipping / Insurance / Returns
    - Or a standard deduction – typically 2% or 3%

Royalty Rate

- **How much** of the licensee's return from using the technology we get
- Royalty rate can be either:
  - Flat
    - Single royalty rate for all sales
  - Tiered
    - Royalty rate is different at different levels of sales
    - Basic marketing theory says that bigger selling products are more profitable
      - Basic royalty theory (25% Rule) says royalty rate should therefore increase at higher sales levels

Royalty Term

- How long we get paid
- Universities usually use:
  - Last to expire patent on a country-by-country basis
- Companies frequently use:
  - Longer of:
    - Last to expire patent; and
    - Expiration of regularity exclusivity; and
    - Ten years from first commercial sale
      - Or more
        - Negotiate!
        - 12-15

    on a country-by-country basis

Royalty Term

- Why don’t more universities use this formulation?
  - Need a royalty step down after patents expire
    - Kimble decision (2015) reaffirming Brulotte (1964)
  - 50% traditional
  - 10-25% meets the test

A Problematic Issue – Combination Products

- An invoiced product that contains several components that could be considered separate products.
  - Your technology is only in one of the components
  - These separate parts may or may not be sold separately.
- If both sold separately
  - Prorate

Combination Products – Example

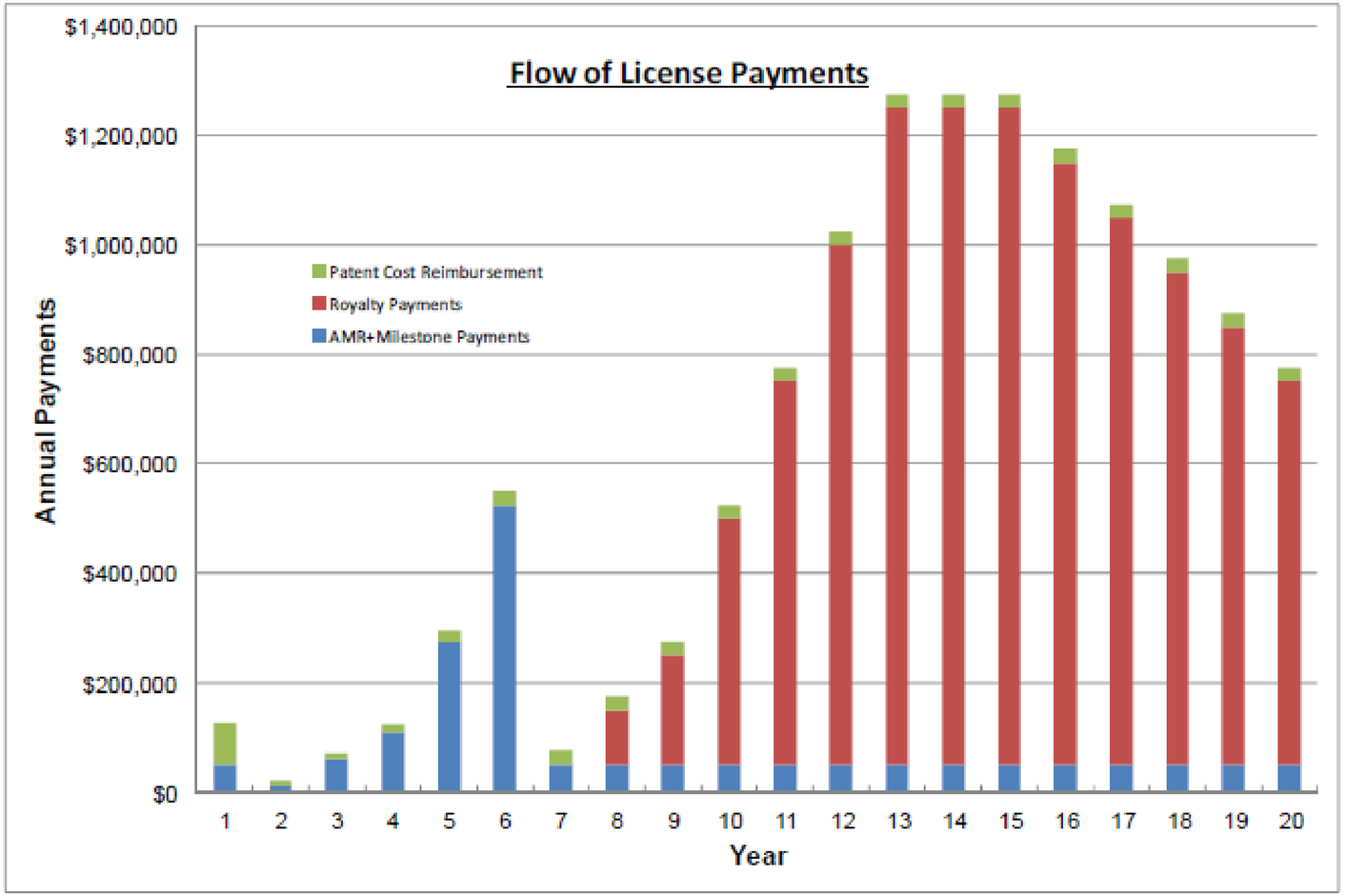
- Issue arises if one component is not sold separately
  - Historically, licenses often defaulted to prorating over CoGS
    - A terrible way
  - I was unable to find an economically rational approach
    - “.....shall be determined in good faith.....”
      - There is no good faith when there’s money on the table
        - You’ll finish up in arbitration
    - May just need to allocate equal value to each component

Example

License issue fee	$50k
Annual minimum royalties	$10k yrs 2-4 $25k yrs 5-7 $50k thereafter
Milestone payments	$50k yr 3 $100k yr 4 $250k yr 5 $500k yr 6
Royalty rate	5%
Sunk patent costs	$75k
Annual patent costs	$10 - $25k

Product Sales

Year	Product Sales
7	$750,000
8	$3,000,000
9	$5,000,000
10	$10,000,000
11	$15,000,000
12	$20,000,000
13	$25,000,000
14	$25,000,000
15	$25,000,000
16	$23,000,000
17	$21,000,000
18	$19,000,000
19	$17,000,000
20	$15,000,000



How to Allocate Value to Inventors and Patents

- Allocating value to inventors:
  - Default position – Equal shares
    - Unless all sign an agreement to unequal shares
    - Can include non-inventors
      - If all agree
- Allocating value to patents
  - May require some judgement
    - E.g.: A drug
      - Composition of value patent most valuable
        - Method of treating, formulation, manufacturing less valuable

How to Allocate Value to Institutions

- Can be very tricky
- Do it per patent in the technology bundle
  - Quantitative approaches:
    - Research expenditures at each institution
    - Number of inventors
  - Remember: Always have a defendable basis for your proposals

Example

- Drug
  - Composition of matter 100% Institution 1
  - Method of treating 50 : 50
  - Formulation 100% Institution 2
- Allocate weights
  - Composition of matter 3
  - Method of treating 1
  - Formulation 0.5
- Weighted contribution

	Institution 1	Institution 2
Composition of matter	300	
Method of treating	50	50
Formulation	--	50
Total	350	100
	78%	22%

The Basic Ways to Approach Valuation – an Economists' Perspective

- Cost
- Income
- Market

The Basic Ways to Approach Valuation -- the Licensing Guy's Perspective

- Cost
- Rules of Thumb
- Industry Standards – Comparables
- Ranking/Rating
- Discounted Cash Flow
- Monte Carlo
- Auction
- Common sense
- Equity

Today

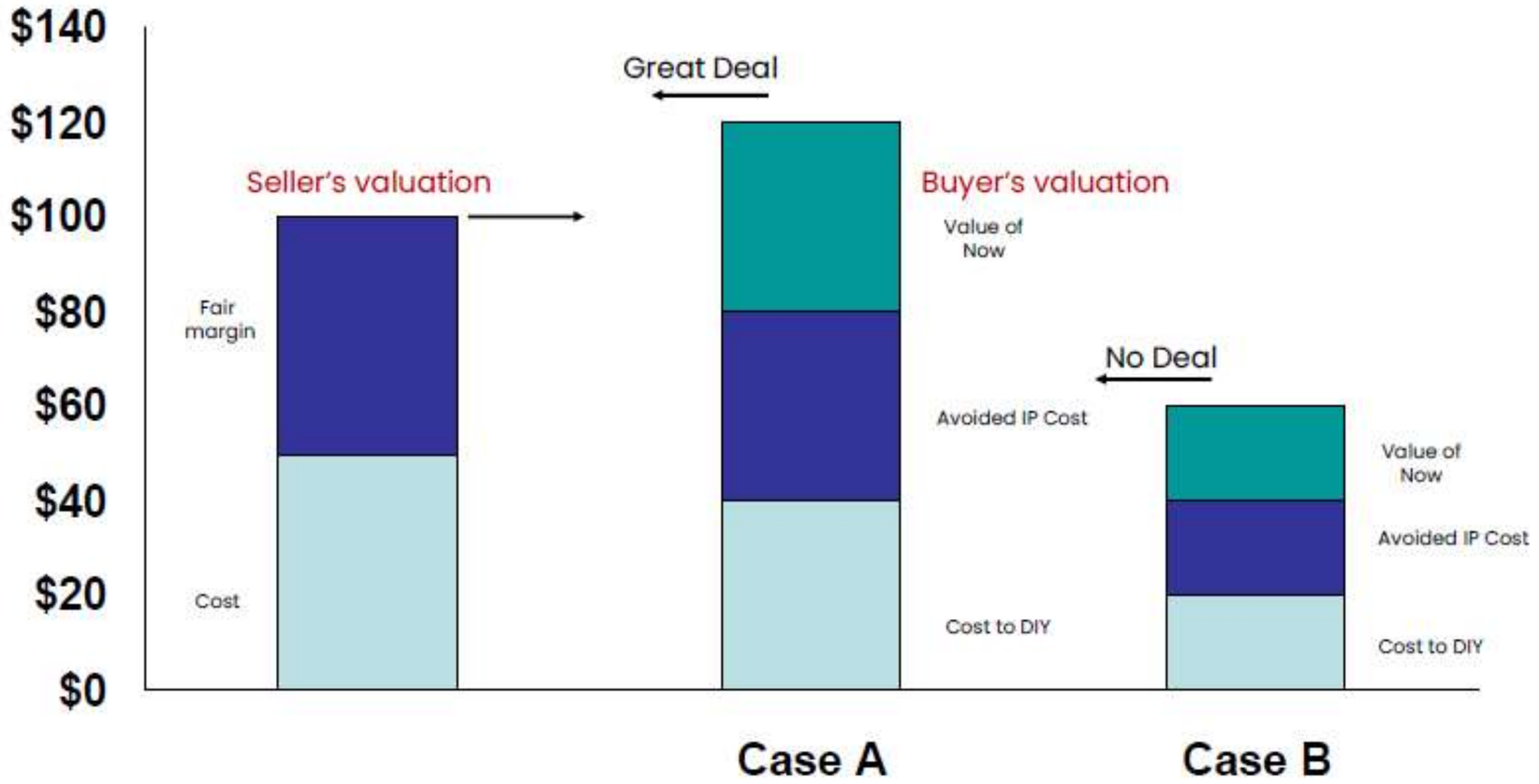
- Cost
- Rules of Thumb
- Industry Standards – Comparables
- Discounted Cash Flow

Look Back -- Cost

Look Back -- Cost

- Cost to develop plus a return
- Is cost to develop relevant?
  - Would you want to or be able to sell a used lottery ticket for what you paid for it?
  - Wasn't the technology developed with a GRANT?
- Two areas where cost enters in academic license negotiations:
  - Sunk patent costs
  - Relative ownership in a collaboration

Cost Driven Negotiation



Examples of Cost-Based Valuations

- U. of Minnesota and Penn State sponsored research models
  - Sponsor can get a fully paid up license for an extra 10% of the research costs
    - 10% of the **fully loaded** costs, including IDC
- Disease foundation funding model
  - Demand royalties in return for their funding
    - Royalties typically capped at 2-3x amount invested

Tech Transfer Online

UNIDO

VENTURE CENTER

Look to your Hand – Rules of Thumb

-- the 25% Rule

A Fundamental Principle of Technology Valuation

The Goldscheider Principle

(aka the 25% Rule)

"The Licensor should receive 25% and the Licensee should receive 75% of the pre-tax profits from a licensed product"

The 25% Rule

- Based on empirical observations
  - 18 worldwide licenses by Swiss subsidiary of US TV company PhilCo starting in 1959
  - Complete IP portfolio - patents, ongoing know-how, trademarks, copyrighted product materials
  - Licensees made ~20% pre-tax profit, paid 5% royalty; were either #1 or #2 in their market despite strong competition
    - 3 year term, so readily renegotiable if terms inappropriate
    - Happily renewed the licenses
  - Concluded that the licenses resulted in successful, long term win-win relationships
- Applicable to fully enabling technology
  - Need to prorate if other IP also needed
- Applied to fully-loaded pre-tax profits, not gross margin

Application

- Expressed as a % of net sales in license

  Royalty rate = 25% x expected pre-tax profit margin

- Example for a patent that fully enables the product:

  $200 sale price

  $100 Cost of Goods Sold (COGS)

  $50 SR&A

  = $50 Pre-tax Profit

  Patent owner share: 0.25 x $50 = $12.5

  Royalty = $12.5 / $200 = 6.25%

  Patent 75% enables product: Royalty = 4.69%

  Patent 50% enables product: Royalty = 3.13%

  Patent 10% enables product: Royalty = 0.63%

Application

- Good starting point for negotiation
  - But almost never the final rate agreed to
- Adjusted according to “enabling value” (%)
  - Typically after analysis of:
    - Manufacturing cost,
    - Market pricing dynamics
    - Value-add by licensee….
- Round off the numbers

  4.5% not 4.69%

  3.0% not 3.13%

  0.5% not 0.63%
- Limited value in academic licensing negotiations because of early stage
  - Incomplete cost data available
  - Very helpful when you’re licensing to a new industry

Look Around – Industry Standards/Comparables

Comparable Transactions

- Probably the most important valuation method for academic licensing.
- Sources of Comparable Transactions
  - Internal database
  - Published surveys
  - Public announcements
  - Word of mouth
  - Litigation
  - Required disclosure

Internal Database

- Licenses previously done by your organization
- Trends over time

Published Surveys

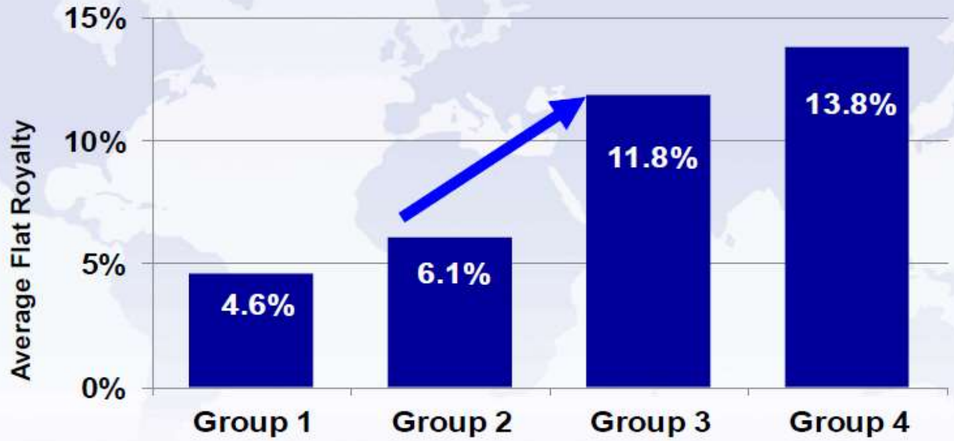
- Relatively few in number
- Most are really old
- Three good current surveys:
  - LES
    - BioPharmaceutical Royalty Rates and Deal Terms Survey (2008, 2009, 2012, 2014, 2016, 2018, 2021)
    - High Tech Survey (2011, 2014, 2017, 2021)
    - Chemicals, Energy, Environmental and Materials (CEEM) Survey (2010)

LES BioPharmaceutical Royalty Rates & Deal Terms Survey – 2021

- 116 complete and used
- Oncology, CNS, Respiratory, Immunological, Blood & Clotting, and Infectious Disease were the most prevalent
- 84% were exclusive
- 59% included U.S. and 54% were global
- 61% pre-IND
  - Very useful for universities
- 50% had expected peak sales >$500 million
- Royalty structure
  - 53 fixed royalties
  - 54 tiered royalties
  - 9 no royalty
    - 2% profit share

Flat Royalties - Combined Surveys
Average Royalty by Stage of Development

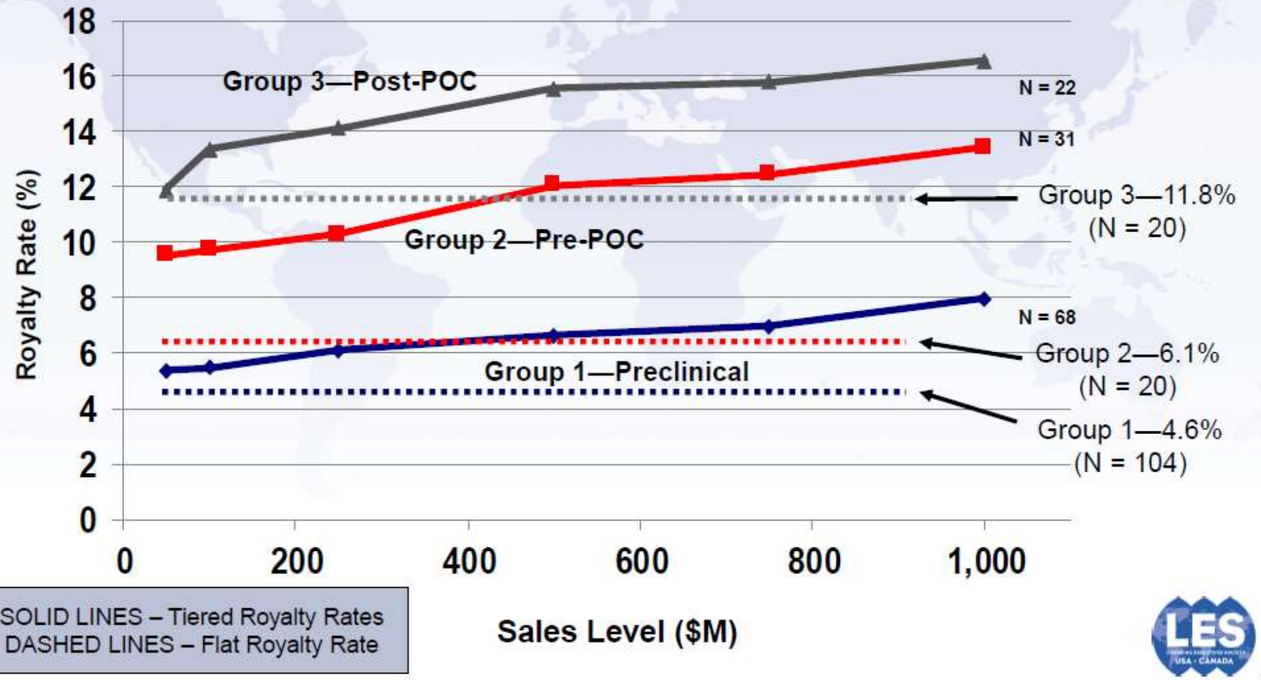
Drawing information from across the six most recent surveys reveals a substantial increase in royalty rate for assets that have achieved proof of concept.



	Group 1	Group 2	Group 3	Group 4
No. of Deals	104	20	20	26
Min	1%	1%	1%	1%
Median	4%	4%	11%	9%
Max	35%	20%	35%	50%

Comparison of Flat and Tiered Royalties
Combined Surveys

The robust data set built from the five surveys supports expectations for increasing royalties as a product matures through development.



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AUTM

- TransACT
- Launched 2015
  - Academic deals
    - “Display or Pay”
      - Contribute a number of deals depending on your research volume
- Has severe limitations
  - The subject matter must be selected from a pick-list
    - All healthcare is the same code
      - E.g., a search for small molecule drugs yields ~80 hits
        - 26 have royalty rates
  - Can’t download all the data into a spreadsheet for analysis
    - One by one
- May be most useful for non-healthcare

Required Disclosure

- Contained in SEC filings
- Company must be public or have filed to go public
- Contained in **exhibits** to the S1 (IPO), 10K (Annual Report), 10Q (Quarterly Report) or 8K (Material Event)
- Only for “Material” transactions
  - 10% of sales, or
  - 5% of assets
- Can redact commercially sensitive information from public disclosure
  - Redaction has increased since transition to electronic filing
  - Redaction only good for 5 years
    - Some databases good at going back and getting the unredacted data

Steps

- Identify comparable transactions that would be helpful models
- Determine if the agreement has been filed with SEC
- Find it!

Accessing SEC Filings Yourself

- SEC EDGAR system
  - www.sec.gov/edgar/searchedgar/companysearch.html
  - Much more user friendly now
  - Companies phased in progressively:
    - Largest January 1994
    - Smallest May 1996
  - For pre-Edgar transactions, early10K will show when/whether it was filed

Some Databases to Find Comparables

Technology	
RoyaltySource	royaltysource.com/
RoyaltyStat	www.royaltystat.com/
Business Valuation Resources	www.bvresources.com/
Life Sciences	
Clarivate (former ReCap)	www.cortellis.com/intelligence
BioScience Advisors	www.biosciadvisors.com
IQVIA (former PharmaDeals)	www.pharmadeals.net/

- All charge – either per agreement ($35) or an annual subscription
- Some let you identify agreements before you have to pay
  - Find them yourself through the SEC

Search Strategies

- No Cost
  - Search using Strategic Transactions (Life Sciences)
    - Physical sciences one has gone out of business
  - Find agreements using SEC
- High Cost Life Sciences
  - Search and get agreements using Clarivate or BioScience Advisors
- Alternative
  - Use a consultant for a specific technology
  - $2-3,000

A Newer Way to Use SEC Filings

- Companies seem to be making much more detailed disclosures of deal terms in their 10-K's these days
  - 10-K's are much easier to find and search than attached agreements
- Example
  - Asian university developing a cellular therapy
  - Model: CAR-T's
    - A leading U.S. company
      - Juno Therapeutics
        - Five academic stage deal terms identified

A Newer Way to Use SEC Filings

- Fred Hutchinson Cancer Center
  - Upfront payment of $250,000;
  - An annual maintenance fee of $50,000 for the first four years thereafter minimum annual royalties of $100,000 per year;
  - With respect to JCAR014 and JCAR017, milestone payments of $6.75 million per licensed product
  - Low single-digit royalties
    - i.e., 3-4%
  - A portion of the payments from sublicensees, on a tiered basis, up to a cap.

A Newer Way to Use SEC Filings

- Memorial Sloan-Kettering Cancer Center
  - Upfront payment of $6.9 million;
  - Annual minimum royalties of $100,000 commencing of the fifth anniversary of the agreement;
  - Mid-to-high single-digit royalties on annual net sales of licensed products or the performance of licensed services by us and our affiliates and sublicensees
    - i.e., 5-9%;
  - $6.75 million in clinical and regulatory milestone payments for each licensed product including JCAR015

Look forward –

Discounted Cash Flow/Net Present Value

Time Value of Money

- DCF and NPV is all about the time value of money
  - Getting $1,000 next year isn't worth as much as getting $1,000 tomorrow
  - Spending $1,000 tomorrow is worse than spending $1,000 next year
- It's just like interest, but going backwards
  - Interest rate ➔ Discount rate

Net Present Value Calculations

- Take into account the facts that:
  - Expenses are certain and early
  - Return is later and uncertain
    - Product may not succeed
    - Market may not be there

Risk-Free

- Inflation currently is around 3%
- Assume we're happy with a 7% return
  - 3% for inflation
  - 4% as a return on investment
  - No risk
- If we invested $1,000 today, we would expect $1,070 in a year
- What about the second year? Another $70?
- More:
  - For the second year, we have $1,070 invested, not $1,000
  - Expect a return of $1,070 x 0.07, i.e., $75 for the second year

Going the other way

- We want back $1,070 in a year if we invest $1,000 today
- So, we would be willing to invest $1,000 / $1,070 or $934.57 today to get $1,000 back in a year
  - 7% of $934.57 is $65.42
  - $934.57 + $65.42 = $999.99
- So the value today of $1,000 in a year's time is $934.57
  - i.e., $934.57 is the Net Present Value of $1,000 one year out with a 7% discount rate
  - 7% is the interest rate going forward, or the discount rate going backwards

Discount Rate Formula

So, the Future Value (FV) 2 years in the future is:

$$\underline{\$1{,}000} + \underline{\$1{,}000 \times 0.07} + \underline{(\$1{,}000 + \$1{,}000 \times 0.07) \times 0.07}$$

Pres. Value — Interest year 1 — Interest year 2

$$FV = PV + PV * k + (PV + PV \times k) \times k$$

or $FV = PV * (1 + k)^2$

So the Net Present Value (PV) of an amount FV two years in the future is

$PV = FV / (1 + k)^2$

We would pay today $873.44 to get back $1,000 in two years

$873.44 is the Net Present Value of $1,000 in two years with a 7% discount rate

Turns out the formula generalizes to $PV=FV / (1 + k)^n$

where n is the number of years in the future

Multiple Payments

- If we wanted to get back $1,000 in each of the next two years, we would be willing to pay

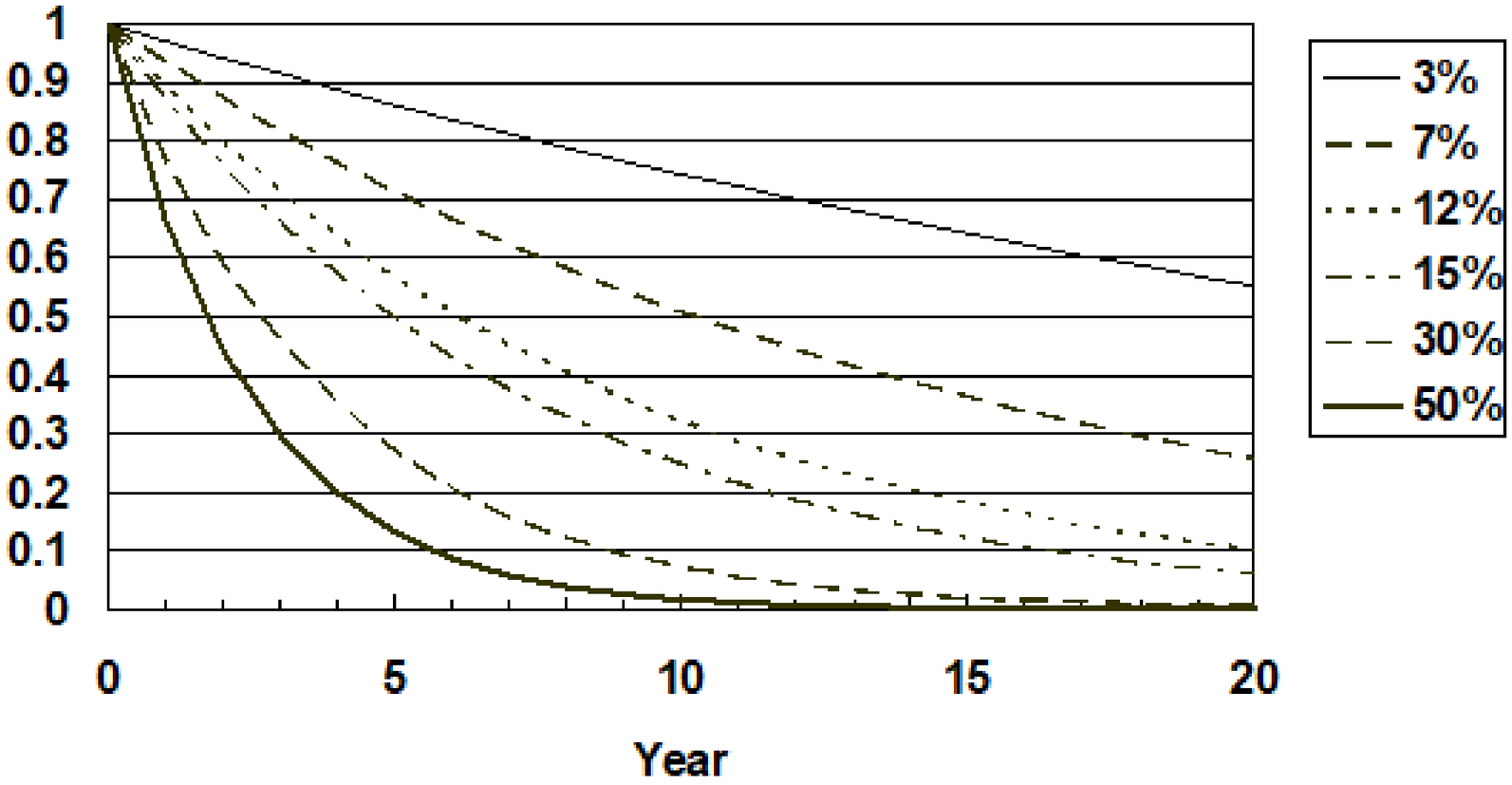
$$\$934.57 + \$873.44 = \$1,808.01$$

  - i.e., $1,808.01 is the Net Present Value of two $1,000 payments one and two years out with a 7% discount rate

Discount Rates

Inflation Rate	3%
Long Term T Bill Rate	7%
Corporate Bond Rate	12% (Blue Chip) - 18% (Junk)
Average Corporate Cost of Capital	15%
Corporate Investment Hurdle Rate	30%
VC Investment Hurdle Rate	50%

Effect of Discount Rates over long periods



Net Present Value of $1,000 in Five Years

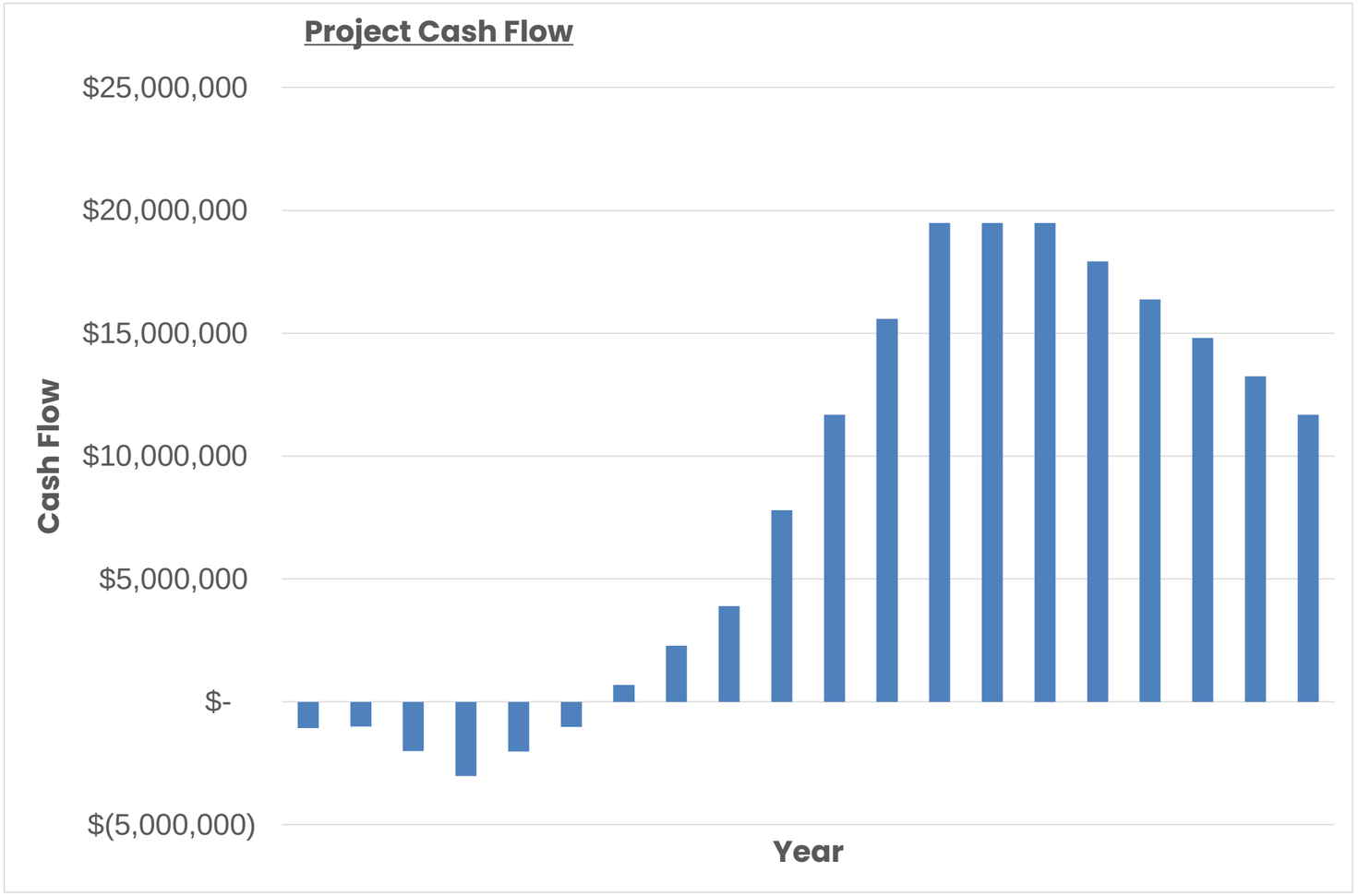
Formula is $\$1,000/(1+k)^5$

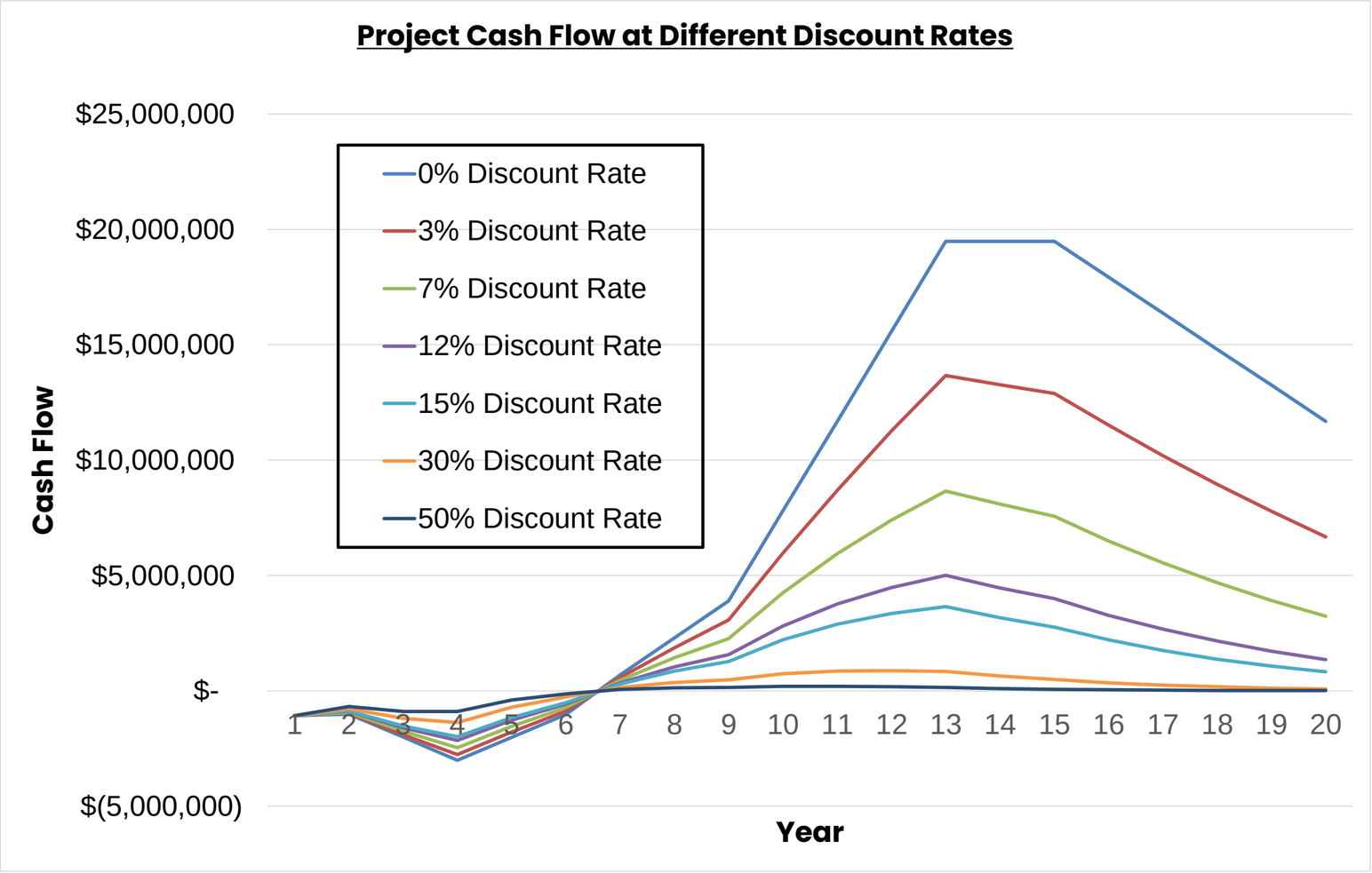
k	Value	Payback
3%	$862.61	1.15x
7%	$712.99	1.40x
12%	$567.43	1.76x
15%	$497.18	2.01x
30%	$269.33	3.71x
50%	$131.69	7.59x

Let's Look at the Licensed Project we Looked at Earlier

- $10 million invested over 6 years
- Sales start in year 7
- Operating costs
  - CoGS 5%
  - S&M 10%
  - G&A 5%
  - Ongoing R&D2%
- Peak profits of $18 million in years 12-14
  - Declining to $11 million in year 20
- Total Net Income of $174 million
  - Net Profits exceed investment by $164 million

Looks like a great deal!





So Is It Still A Good Deal?

- The answer depends on the discount rate

K	NPV	Payback
0%	$164.3	16.4x
3%	$107.0	10.7x
7%	$61.4	6.1x
12%	$31.1	3.1x
15%	$20.6	2.1x
30%	$1.0	0.1x
50%	$(2.7)	NM

Let's look at the 30% Case

- Licensee achieved their 30% return
- Project is still worth $979,937 today
- This amount is available to pay the licensor
- Could ask for $979,937 upfront
  - Unlikely -- puts all risk on licensee
- License terms in our example rate have an NPV of $864,014 with a 30% discount
  - Licensor NPV is still $115,922
- Goal seek: set Licensor NPV = $0 by varying running royalty rate
  - 5% ➔ 6.4%
- Or by increasing final milestone payment
  - $500,000 ➔ $930,412

Mechanics

- Easy to do in spreadsheets
- Excel has an NPV function
  - Handles up to 29 years
- Do your own
  - Calculate a Discount Factor for each year
  - First year is 1
  - Second year is 1/(1+k)
  - Third year is second year/(1+k)
  - Etc
  - Multiply each year's cash flow by that year's Discount Factor
  - Sum

Where Do You Get The Data?

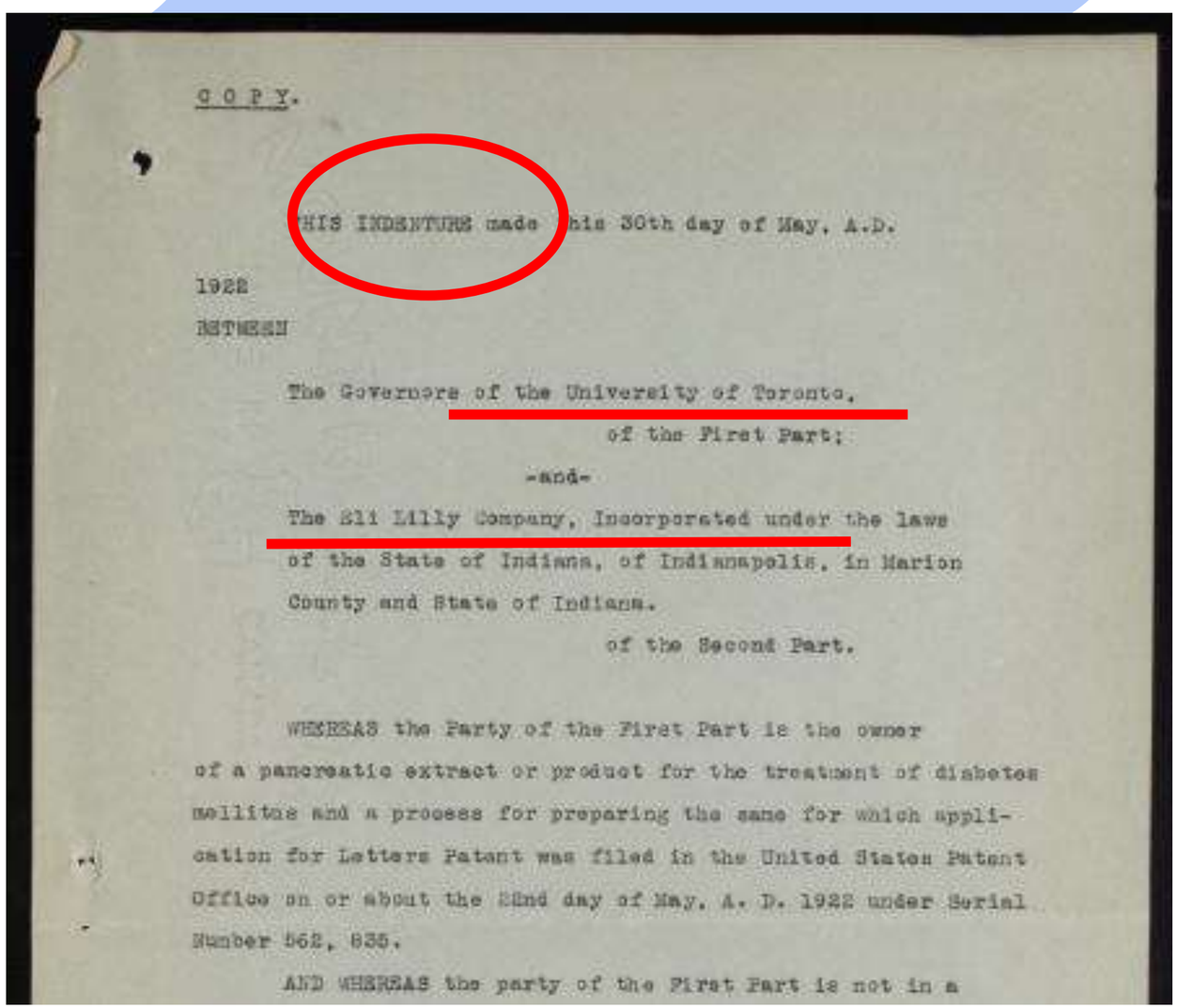
- Ask the licensee for their projections from their business plan
- Analysts reports
- Trust, but Verify!

Combining the 25 Percent Rule and NPV Analyses

- The Twenty Five Percent rule allocates Net Profits between licensor and licensee
  - Reflects past and future financial risk
- NPV is the best measure of Net Profits
  - It's the present value of Net Profits over the life of the project
- Apply NPV analysis of licensor's and licensee's cash flows and see how they compare
  - NPV Split analysis

And if all else fails.....

5%



C O P Y.

THIS INDENTURE made this 30th day of May, A.D.

1922

BETWEEN

The Governors of the University of Toronto,

of the First Part;

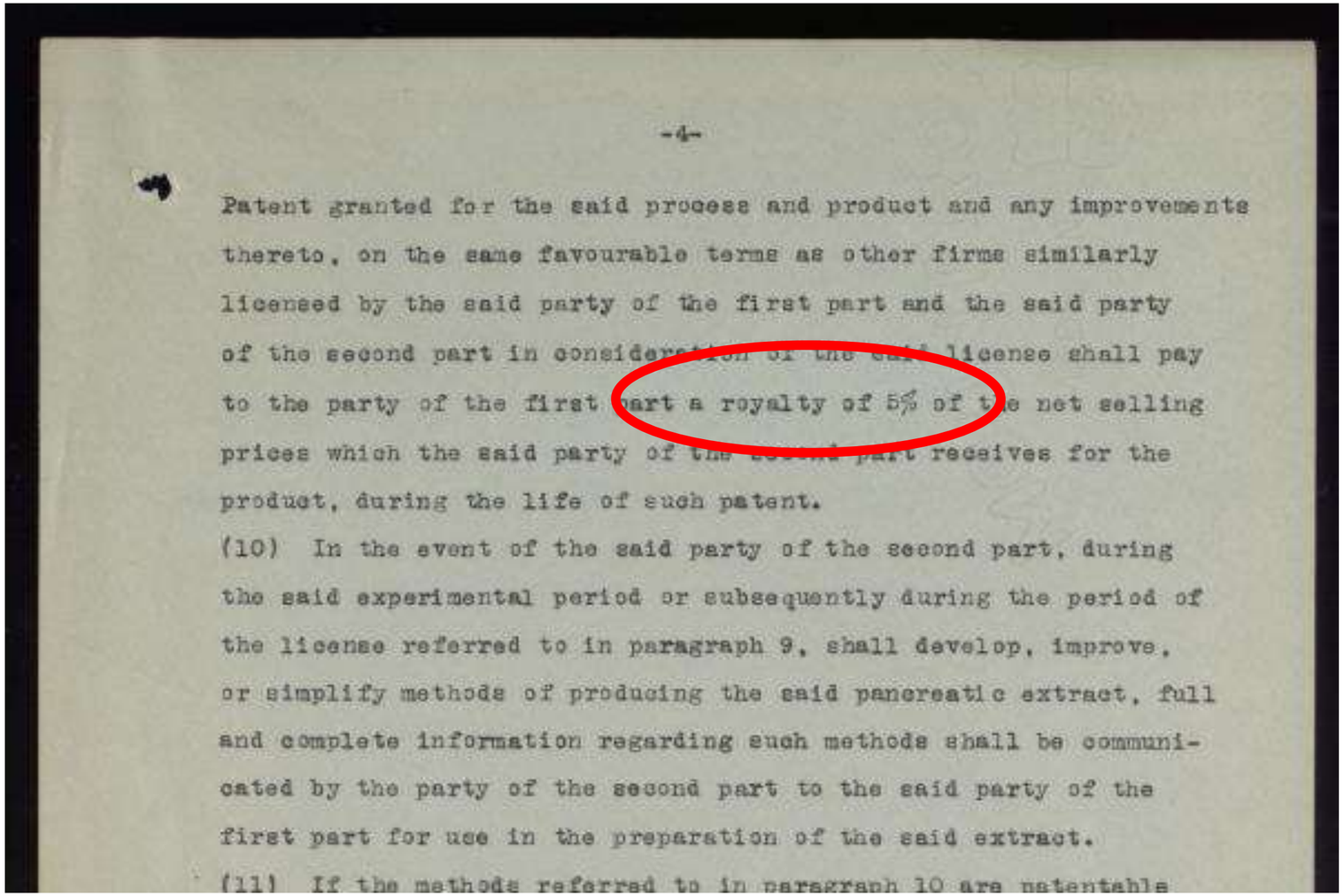
-and-

The Eli Lilly Company, Incorporated under the laws of the State of Indiana, of Indianapolis, in Marion County and State of Indiana.

of the Second Part.

WHEREAS the Party of the First Part is the owner of a pancreatic extract or product for the treatment of diabetes mellitus and a process for preparing the same for which application for Letters Patent was filed in the United States Patent Office on or about the 22nd day of May, A. D. 1922 under Serial Number 562, 835.

AND WHEREAS the party of the First Part is not in a



-4-

Patent granted for the said process and product and any improvements thereto, on the same favourable terms as other firms similarly licensed by the said party of the first part and the said party of the second part in consideration of the said license shall pay to the party of the first part a royalty of 5% of the net selling prices which the said party of the second part receives for the product, during the life of such patent.

(10) In the event of the said party of the second part, during the said experimental period or subsequently during the period of the license referred to in paragraph 9, shall develop, improve, or simplify methods of producing the said pancreatic extract, full and complete information regarding such methods shall be communicated by the party of the second part to the said party of the first part for use in the preparation of the said extract.

(11) If the methods referred to in paragraph 10 are patentable

For More Information

- Intellectual Property Valuation Manual For Academic Institutions
  - Ashley J. Stevens
    - World Intellectual Property Organization (WIPO), Geneva, Switzerland, March 2016,
    - Available at: http://www.wipo.int/meetings/en/doc_details.jsp?doc_id=332588

Questions?

UNITED NATIONS
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Contact Us

https://www.low-carbon-innovation.org/

https://www.venturecenter.co.in/

https://www.techtransfer.online/

ttonline@venturecenter.co.in