CONCEPT TO COMMERCIALIZATION

TITUTE
CENTER FOR JOBS AND HUMAN CAPITAL

ABOUT THE MILKEN INSTITUTE

M a , a a a m a

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27

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INTRODUCTION

a a va v a v a mm a
a a a v - m m a .
m a a v a a m , a m
a m m a va .[2]
va a a v m (&D) a v ,
m a f - a a a Am a a
v .[3] A , - a f ma a a a m
a a a a a m m mm a
a a a , a a a
a m m a .

21 , a va a v a a a
f a a f - a a m
v m . a m
- a m v m : a a ma a a
a , a a a a v f va -
m . f a a m , a f
f v a a v m .[4]

m a f v v a ( )
a va f m a . f ma a f
a v a m a a a a v , ,
, a a a m a - a f m a -

TECHNOLOGY TRANSFER, COMMERCIALIZATION PROCESS, AND REGIONAL ECONOMIES

2.1. TECHNOLOGY TRANSFER AND COMMERCIALIZATION PROCESS

v a f a mm a a a a m f a m m a a a 1930 a 1940 a C m a f . C m a v a f f a a ff f a a . F , C m a v am a f a f Am a a a D v m , f am v a a m, f ma a - ff .[14] A 1930 , a f a F ma a f a m a a a

va - a a a a f f m , m m
a a m a a , ava f -
. va v f ma a a a
a , v , a m f m .

a v a v m a a m-
m a a f m f m a a
m .[19]

a a a v m v m a a a
a m f m a f ma v a
v a f . a a a
m a av a v mm a a a a ,
&D av a a va a v a a
v a . a va
f a ' va m , a a a
a m va a f am a am m. v
f a a a a v m &D a m v a
a a a a af va a .

a a a a m a f v
. m a v v a m a
a a af a a v a a . a , a a
v a v a a (a f a m
a a f a va f , a v f ma , a a
a a a mm a av) a f m v -
a a m .

A f a m a a f v -
v . a f m a a ,[20] a f a a m
v - -v a a a,[21] m a
m a v ,[22] a f a . A
f a a a f v f a v .
a m m m m v f a a
a v a .[23] a f - , a f ma-
a a a m m a f a m .

2.3. HISTORY OF TECHNOLOGY TRANSFER

a a mm a a f a a v -
a f a a a a a a a f ffa a
a affa .[24] m a a a a ,
f am , f a f v
m , v f ma va . a -
v a a a a a f a a f a .
A a, ma a ma ava a f .
a m f .[24] , a a
f v a , a , a a a
f f , a mm a a m f fa a .
a v , a m m a f ff v a f a a v
v , a a a a a a
a a v am a .

m m a a a f m v a
1980 . Ba -D A , am a 1981, a v a
a f a f a a m a a a f
f . v m .[25] a a a a v f v -
a va a a . a
a a va , a a m a m a v
f mm a a m v f v m a a
v . a ,f am a f C f A a f
F a C , f v a , a a
m a a v a f v m a m .[26] a a
a f A 1980, m f v . a
f m 25 200.[27] m f - a a a a m a
1995 a 2015.[28]

2.4. SUMMARY OF SCALE OF ACTIVITY

M a 1,000 m a a a 2015 a a
v , m a 70 f a - a a m a a
a a v .[29] a f a f a f
m a 6,600 a a f -
m m f a a a m a a
f a a m a 17 6,300.[30] a a a v
a v a , v m a a a f
f a v a a ma m , a
v v a v a va m .

UNIVERSITY TECHNOLOGY TRANSFER AND COMMERCIALIZATION INDEX

D v m f a a a a v m
f a a ; v , v
a f a C mm a ( ) a m - a ma a f
a a v am a a .

a a a A a f v
M a a (A M) v a A M ' A a A v v ,
, v f Ca f a m.[31]

m a f a av a (2012-15)f f a f
a f : a , , m , a
a - f m . a ma a af a av a f a
a v a v f a a va a ,f a a f .

Ea v a v m m ff , ,
a afa (a va) a
a a a v a mm a a . F am , a v
f v a mm a a
a a ff f m a v a a va a .

a a , a ma a m
a a aa a a a v m a f mm a a .
a a a a v a a a a f
a v a mm a a m a v a ma v . a
m a a m a f a v . v , a m
m a ' a v f f mm a a a v . F
a , m m ma a .

a 2 a a va a a a , a
a a a f m . a
a a a f m , a f
100f a . a a v
f ma a m .

Table 2: University Technology Transfer and Commercialization Index Variable Weights

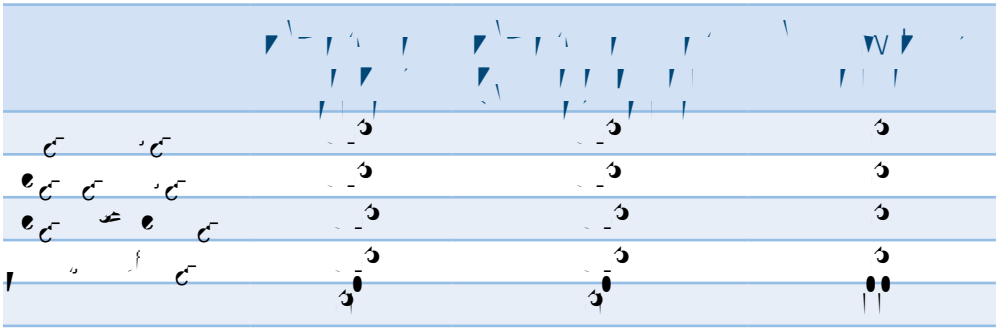


Table 3: University Technology Transfer and Commercialization Index: Top 25 Institutions

A DEEP DIVE INTO UNIVERSITIES AND THEIR RANKINGS ON THE INDEX

University of Utah (a) v a f a C mm a a (a f 100), f m 14 a a a 2006. M a a ' 2006, a v v f m a v a a m a mm a a .[35] a a a $417.2 m a 2015, a am a . a a a a a ; a , , m , a a - a a ma a , a a a a . a a m m a a - v v a .

F m 2012 2015, a a $211.8 m m $135.8 a m a . v am a 69 a - , a ma a a m m a v a a C , a ma m a a a. a a a a a a v m a ma a a v f a f a a a . a C mm a a (C) f am a va a a m m , a a a mm a a . C mm a a E C mm a a , a a m f a f a f m a va f ff a ma f .[36]

a v f a a v f a 2016, D . A ma a a m a a a f a :

> mm a a f a v a v f a a a m m a ' v a mm . - v ff a a a a v a a a a a . A v f a , f a a C a a a a f m v a a .

v f a a ma ff f a a mm a a f m a a f a . A C f M a va (C), a a va av a a .[37]

Figure 5 Top 25 University Technology Transfer and Commercialization Map

Columbia University
C mm a a .C m a a 2006 a a v ′

Stanford University' a m , m a f , ' a a a a ma a a a . a f mf 2006, a f ' f a a m a v . a f ' mm a a f ma a ' a a a . v - a a a , a m m a , a f m a a a mm a a a . m a va a m f m a a a a f a f ma a a . a f a a m . v , m a a f a $946.4 m a 2015, m a a f f a f , m f v (a a) (a , , m , a a -).

a f ' f f ( ) a a 1970, f a v a a f Ba -D A . a m a va a $5,000. C m a v 1970, a a a a $1.77 a . f a a , $319 m a m , $318 m v a $308 m .[44] a a ma a a v a , ; a a ma ( ) a a a a a f f a m a ; , a a , a - a v v m . M a a a f a f ' va , f a 1971 a f a v F ama a' a a , ma , v .

University of Pennsylvania ( ) a , a f 95.39, f m 12 2006. C f ma a a a a m . C f va a ' a am a mm a a a a - 2014. a a - a a f , m a $888 m 2015, a $3.6 2012 a 2015. m a $42 m 2015.

va C v a a a f va v a v , a f m a a f 23-a va a a a a v . - a ava a v a v a va - m , a a a a a . a a ,f am a a a ma a m va va - C f A va C a a a am . Am G ma a a m a va a a a a ,f f a a .

University of Washington ( ) a v , a a a a f m 24 2006, a f 95.11. a - , m a 1,000 2012-2015. m a a , a $42.8 m 2015. a C M 2015, a m a v va m. C M a , va a , a m a a m f va a f a a a f , a a a f a ava a f 30-50 a - a .

A a ff a a a , $1.4 a
2015. f a a af f a a 2016, a
27 f a - C a a a a
. f ma a f a m ma 26 , A
a f $200 m 2016. a a ma a m

Carnegie Mellon University a 10 a f 93.72. a , a m - a m a a , v a v a am a f a a f a m- m a a , C f a f a E C a (C EC). m , a a v f Ca M ' m a m , v a a a v , m - a , a m a a m a . G a , f , a a va v a a f a . a a a a a a , a a m f $60,000 v m M G C m .

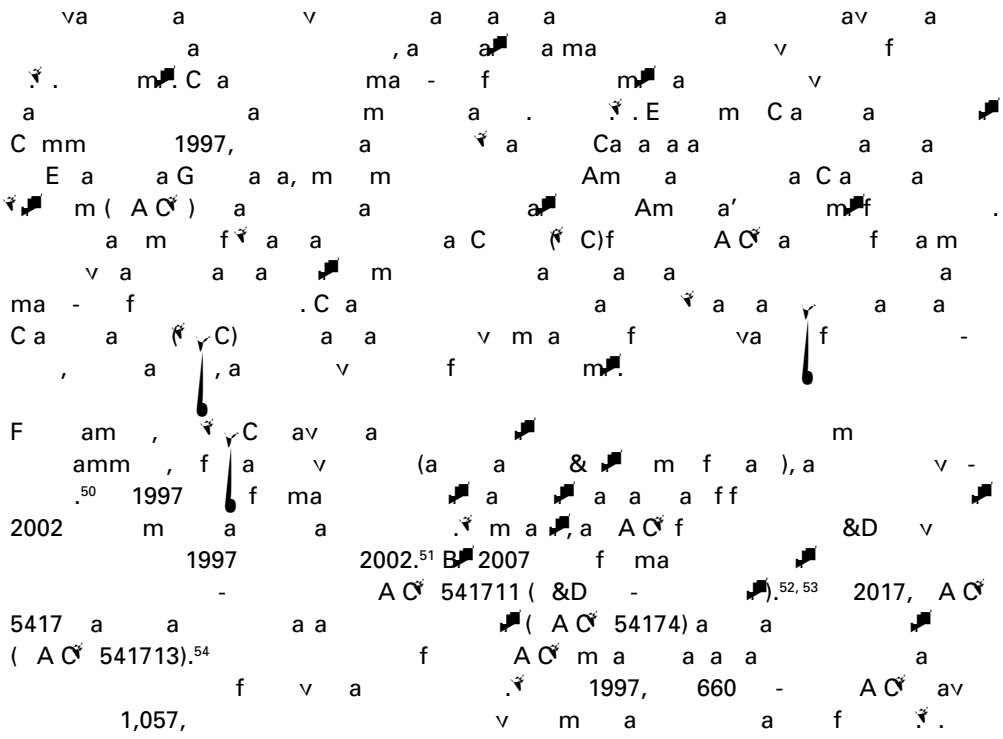
A av a m a , Ca M a a $244 m a 2015. v a , 312 2012 a 2015, a $38 m m a a v am . Af v a m a f a a a v Ca M v f M a, a f m a a A a av , a a M a v m . a M a v G ., av , a f a M a a

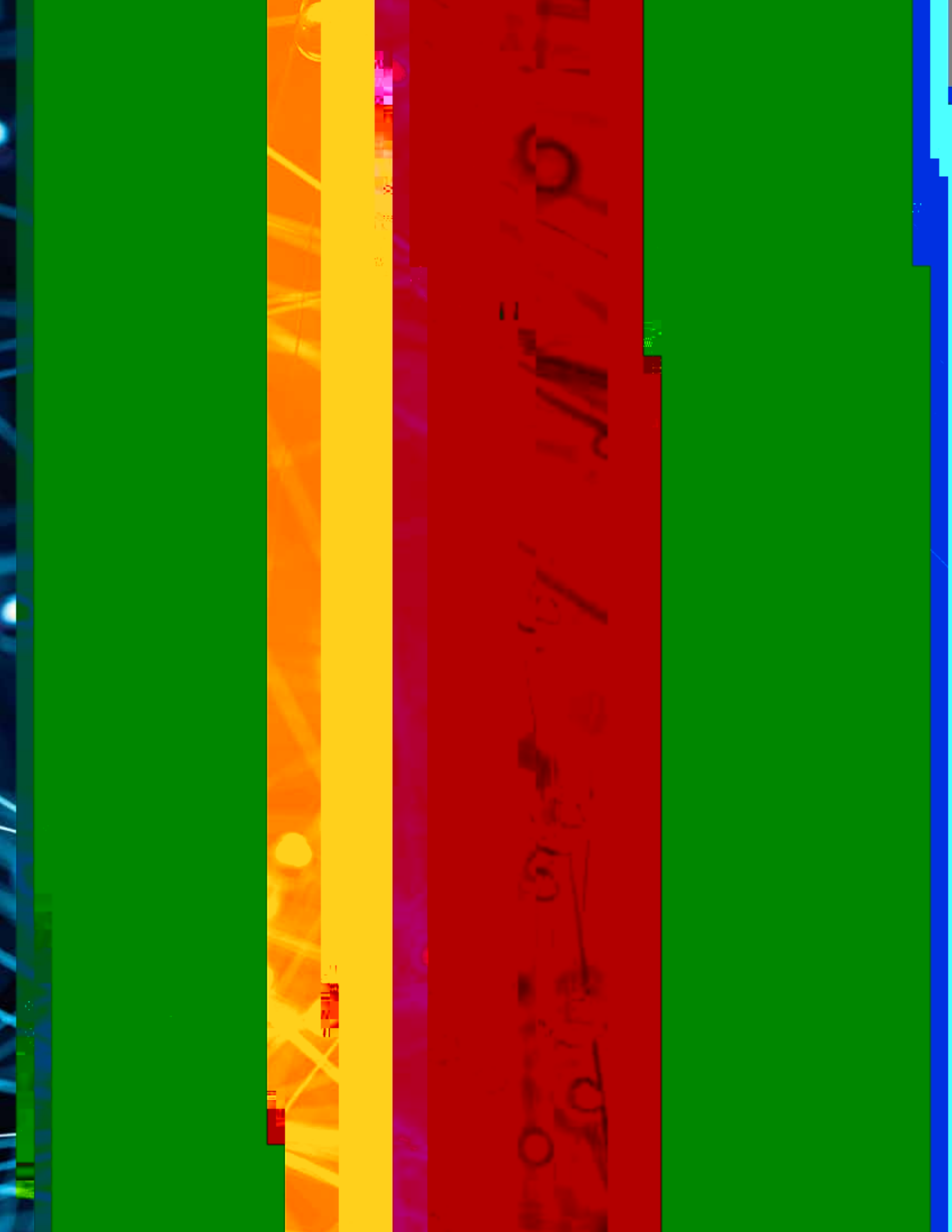
Arizona State University (A) 21 , a m v m v m f m 43
2006. M a C ' a , a
a a m a mm a a . A E a f m 2003
ma a A ' E v a M a a m C m a . a
a a m a f A v a v
ma a . A m mm a a f ma ( ) a v
f a a ( ).[47]

University of Central Florida (CF), a a , 22 . CF
a f f ma A M 2006. A a a
a a f a a a m a 2006, a , a ,
a M m a a m
m a .[48] v m a a CF a Cam a a
a m a ' 170,000- a f m a a
f a ,f a a a a m , a a
198,000- a f B B m a , a mm -
a a f .[49]

Northwestern University

UNIVERSITY TECHNOLOGY TRANSFER AND JOB CREATION





CONCLUSIONS AND POLICY RECOMMENDATIONS

a v a f a Am a a m
a f va . F a a f f f v
a v a a v m a a f . a
f a f a Am a m .

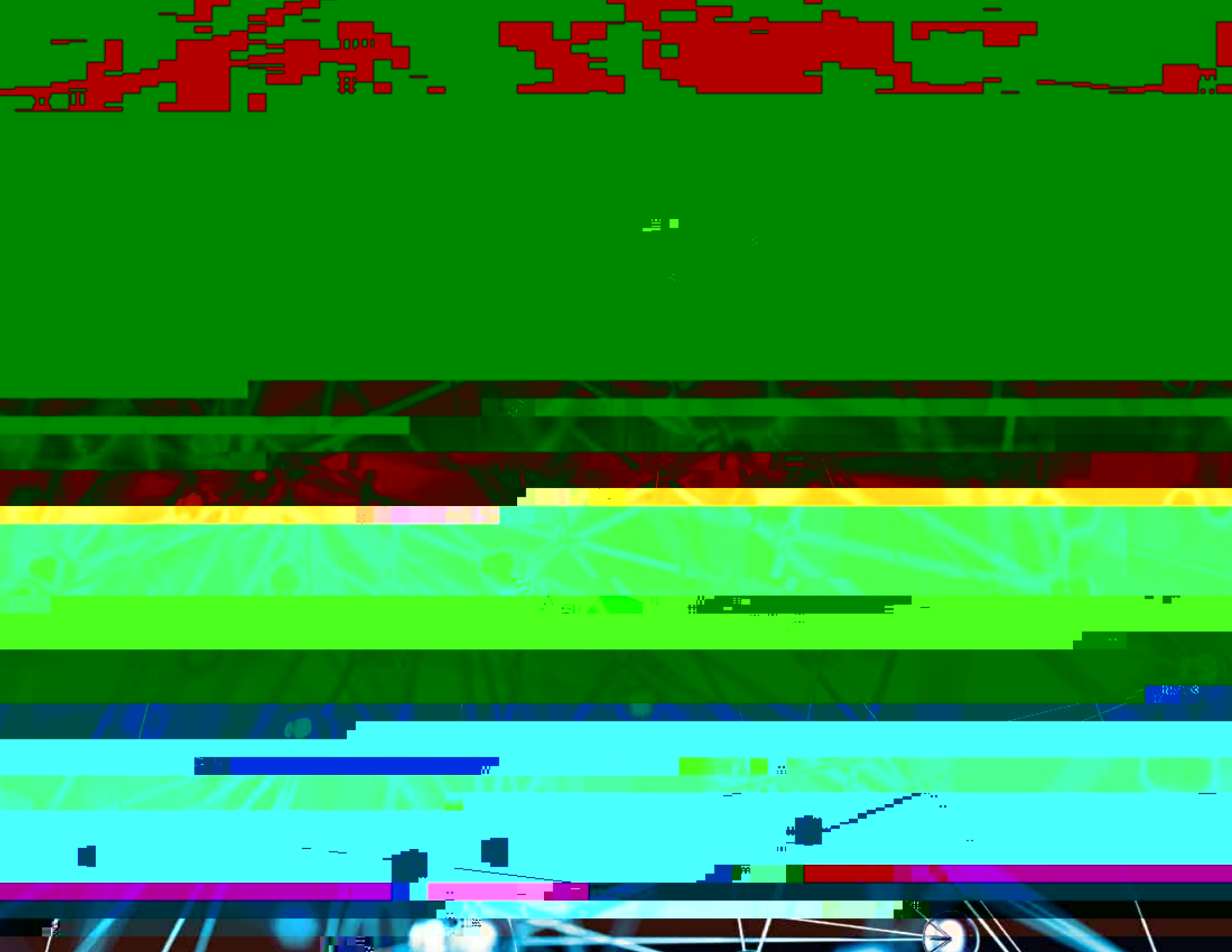
v a a a f a mm a a
a va v . a a a , 13 f 25
v a a a , a a ma m a a , a a a .
v a v a a a m a a
m a . va a , a av
m f v a v a f m .

v a f a a f m - a -
va , mm a a a a f . A
a v a a a , a a m a f m
m a f a m .

v a a f m v a va a ; a a f
a &D a - a f a a .

v a a M ’ v a f a
C mm a a a v m - a f , a v
a f m a . a a M ’ m-
m a a :

- **Maintain basic scientific research funding.** Ba a v - m
m a v a a a a a
a f mm a , a v a a
a .
- **Incentivize technology transfer through a new federal commercialization fund.**
f a f f v , f a v m
a a f a a mm a a ,
m va m . v m a a m-
m a a ma v f am.
- **Increase technology transfer capacity through federal matching grants.** f -
a v m mm a ma a am a f
a a aff a a . m a
a ma a ma a av m m a . a
f a a m a a v v a - a
a v a m . m av v a
a a f .
- **Increase technology transfer efficiency by adopting best practices.** A a
v , m m a v a f
a mm a a a v . f f
a v f 25 a f a
C mm a a a a , a a m f
ava a f v a a a a a m am ,
m va a .



FULL RESULTS

81	S U y	72.11	64.01	81.16	68.20	78.65
82	S f B S	66.94	77.52	87.65	58.00	78.60
83	U y f f , S B	88.37	69.16	62.33	77.29	78.44
84	B m & m H .	68.57	75.07	86.94	57.55	78.02
85	U y f	73.92	63.60	81.24	65.69	77.96
86	H B	75.51	77.31	88.16	51.99	77.87
87	U y f A f M S	55.74	59.21	83.58	72.75	77.85
88	S U y	79.60	60.81	80.00 64.17	65.23	77.78
89	S H y	50.15	72.97	86.80	65.47	77.64
90	U S U y	70.33	69.53	80.68	64.17	77.55
91	U y	72.53	60.32	.5		

124	U	y f	D m	68.78				

210	F U y	0.00	67.93	0.00	65.66	35.89
211	B y y	33.07	25.70	29.20	39.36	35.50
212	F y	43.62	0.00	70.49	0.00	33.77
213	M U y	34.29	0.00	67.43	0.00	31.10
214	U y f F	0.00	39.25	62.56	0.00	30.06
215	F U y	19.80	0.00	69.70	0.00	29.61
216	U y f M	64.26	46.63	0.00	26.71	28.11
217	U y f F	0.00	0.00	67.27	0.00	25.47
218		18.86	25.38	47.55	0.00	25.18
219	S U y	37.11	26.62	0.00	0.00	10.34
220	A yO y	47.09	0.00	0.00	0.00	7.64
221	U y f y	0.00	41.73	0.00	0.00	6.77
222	H Sy	31.73	0.00	0.00	0.00	5.15
223	B S U y	29.85	0.00	0.00	0.00	4.84
224	U y fD	24.78	0.00	0.00	0.00	4.02
225	f S U y	0.00	0.00	0.00	0.00	0.00
225	y- A U y	0.00	0.00	0.00	0.00	0.00
225	H U y M	0.00	0.00	0.00	0.00	0.00
225	S U y	0.00	0.00	0.00	0.00	0.00
225	S U y	0.00	0.00	0.00	0.00	0.00
225	S	0.00	0.00	0.00	0.00	0.00

APPENDIX

7.1. METHODOLOGY OF INDEX CONSTRUCTION

Step 1: Data Collection

- A M a af f m a av av a v va a a a a a a . (1) a , (2) , (3) m , (4) a - F m , a (5) a a F . a a f f a a a .

Step 2: Transforming Variables-part 1

- a , , m , a - a a a - a a F . a a f va a av a a a a .

Step 3: Transforming Variables-part 2

- a a f va a a a a a a m.
- F m a f 100 a f a va a .

Step 4: Index Calculation-Stage 1

- a av a va a a a a f m a 50%-50% a m m . f ff va a .

Step 5: Index Calculation-Stage 2

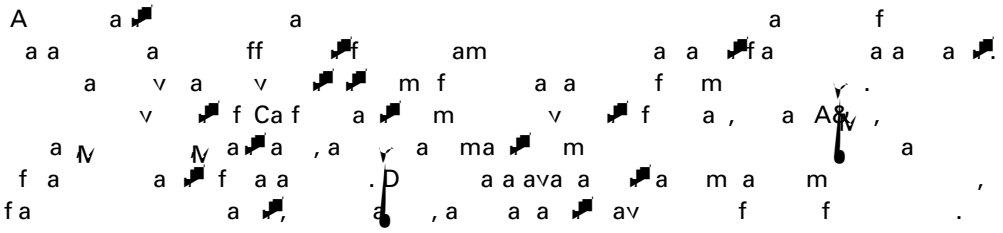
- f va a : a (15%), (15%), m (35%), a a - F m (35%) a m va a M va a a a .

Step 6: Index Calculation Final Calculations

- F m a a f 100 a - f a va a a a m.

Table 6: Milken Institute

Indicators		Weights for Stage 1	Weights for Stage 2



7.2. SUPPORTING TABLES FOR CASE STUDY IN SECTION 4.2

Table 7

One tail two-sample T-tests of equal variance with correlations		
Correlations (T-statistics)	**NAICS 3254 Employment**	**NAICS 3391 Employment**
Hospitals		
Medical School		
LN (Total Research Funding)		

Table 8: Life Science Metro Clusters vs. States

Metropolitan clusters of the top tier states by sectors 3254 & 3391 output	Bottom tier states by sectors 3254 & 3391 output

ENDNOTES

1. Ca f a' va -Ba E m : M a a a E a M 2015.)
2. D , a M a a a, a a : a Am a' va E m , M , , 2016, . 16-17.
3. am a M , F : E a v - a D v E m G . a , E v , m 35, 2006, . 1499-1580.
4. D , - , A m B a , a a a , A M a f D : Eff f E a a A a m a E m , M , F a 2013, . 2-6.
5. :// .a m. /A M M a /m a/ v DF/A M F 2015 a F A . f
6. D , A m B a , a , M M a : A G a A a f v B a f a C mm a a , M , m 2006.
7. M a a M . , D a &D v , a f E m B av a a , . 53, 2004, . 237-260. A C. B a , . B , a G M . . a , C , va a G : A C m a a v f E a C , . . D a . M (M a a F m : G a- a D mma, (: 2001) . 190-214, a . Ba a a G M . . a , D am f F m G a E

15. D , C : A a a mf Ca f a' E m , Z M a a , , 1999.
16. D , , , A m B a a , Am a' B a f C , M , 2004.
17.

D m 2011 :// . a a . / a /251514571 Dff
a f -Ba a D v m -Ba
a f M a m a Ba , A 1/4/2017

61. A . , D a . , Ba B ma , A Em a A a f
f A a m E a f ma v a f ,
a C a C a . 16, .4 24/06/2017, a 12/29/2017

62. B a f a a , a a Em m a M a 2015
a a a a Em m a a E ma ,
A C 325400 - a ma a a M M a f a , :// . . v/
/ / a 4 325400 m a 2/17/2017

63. .

64. .

65. B a f a a , a a Em m a M a 2015 a a
a a Em m a a E ma A C 339100 -
M a E m a M a f a , :// . . v/ / /
a 4 339100. m a 2/17/2017

66. E a a a , m a ma a, E

67. C B a 2014 M A m m a a

68. G E , E a . G a a am . , a Ca a m-
a ? Ev f m C a m a a , Am a E m v ,
100, .3, 2010, :// . . / a /27871244 a 1/9/2017

69. .

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