



Department of
Economics and Finance

! " # \$ % & ' () * + , # (- " . / 0 1 0 (

! " # \$ % & ' () * + , # (- " . / 0 1 0 (

! " # \$ % & ' () * + , # (- " . / 0 1 0 (

! " # \$ % & ' () * + , # (- " . / 0 1 1 2 3 % & , !) 4 5 ! " 2 4 () 6 0 2 4 ! 0 4 ! 7 8 % !
" & # / (2 * 9 & % 4 * # ! :) & + % (, !
! " # \$ % & ' () * + , # (- " . / 0 1 0 (

!

! " # \$ % & ' () * + , # (- " . / 0 (+ 1 & - 0 2 , 2 3 4 0 5 !

!

!

!

! "#\$%&' () * +, % +) - + . (, + \$ & ' / 0) 1 ((23 ('4#) 5 + 4#
6 + 7% () 8 . + # 4 (\$ () + 49) : % ; (\$ +) 8 . + # 4 (\$ (

!

!
< . , % \$) = > = >))
)
)
)
< 7 ? @ , + ; @

\$ % & ! ' (') * !) + (, % -) & ! ,) (- ! (- . ! / 0 1 (2 % 1 % 2 3 ! & ' % 1 1 0 /) * & ! 4) 2 5)) - ! 2 \$ *) ! , (6 0 * ! 7 * 3 ' 2 0 7 8 * *) - 7 %) &

!

"

) [8%2%) &! 0*! J01.;! 402\$! 8-70-.%2%0-(113! (-.! 70-.%2%0-(113@! A') 7%B%7(113;! \$)! ,) (&8*) &! 2\$)!
70-.%2%0-(1!2(%1H*%&!?!8&%-J!2\$)! FOR(E!970-.%2%0-(1!/(18)H(2H*%&!?! ,) 2\$0.!%-2*0.87).!43!D.*%(-!

5%2\$! & , (11)*! 2*(. %-J! /018 ,)&! (*)! B08- .! 20! 70-2*%482)! 20! 2\$)! ' *0' (J(2%0-! 0B! &\$07?&@! : 3!
70-2*(&2;! I 082 , 0&!90P"U>!. .)2)72&!(! .0 , %-(-2!*01)!B0*! : %270%-!%-!2)* , &!0B!*)28*-!(- .! /01(2%1%23!
&' %110/) *&! (, 0-J!2\$)! "U!1(*J)&2!7*3 '2078**)-7%)&!43! , (*?)2!7(' %2(1%c(2%0-W!\$)! (1&0!B%- .&!2\$(2!
&' %110/) *&! \$(/)!4)) -! %-7*(&%-J! 0/)!*!2% ,)! (- .!)+\$%4%2!&' %?)&!70**)&' 0- .%-J!20! , (60*! -) 5&!
)/)-2&!70-7)*- %-J!7*3 '2078**)-7%)&@! I (2&% (, ' (!90P"Y>!)&2% , (2)&!(!CDEFGH : = I I ! , 0 .)!(- .!
B%- .&! /01(2%1%23! 70H , 0/) ,)-2&!4)25)) -!B%/)!7*3 '2078**)-7%)&W! B8*2\$)*;! <%2)70%-! (- .! : %270%-!
402\$!)+\$%4%2! (! &2*8728*(! 4*)(? ! %-! 2\$)%*! 70- .%2%0-(! /(*%(-7)@! D-20-(?(?%&!)2! (1@! 90P"Y>!
%- /)&2%J(2)! -)250*?!70--)72). -)&&!4)25)) -! %-)!7*3 '2078**)-7%)&!8&%-J! (-! (' '*0(7\$! 5\$!7\$!
)+2) - .&!2\$)!B*(,)50*?!0B! S%)401.!(- .!T%1 , (c!90P"e>;!&')7%B%7(113!2% ,)H/(*3%-J! '((,)2)*&!
' *%-7% '(!70 , '0-)-2!(- (13&&!9#R^H^FD>W!&%-7)!70--)72). -)&&!(' ')(*&!20!B01105!(! .)7*)(&%-J!
2*)- .;!2\$)3!2\$) -!&' 1%2!2\$)!&(, '1)!%-20!' *)H!(- .! '0&2HD8J8&2!OP"V!&84H&(, '1)&!0-!2\$)!4(&&!0B!(-!
%-7*)(&!%-! , (*?)2!7(' %2(1%c(2%0-!(2!2\$(2!2% ,)!;(- .!&\$05!2\$(2!105)*! /01(2%1%23!%&!(&&07%(2) .! 5%2\$!
5)(?) *! 70--)72). -)&&@! d , (-)HD.6)'0-J! (- .! D1(J% .)! 90P"Y>!)+(, %-)! , (*?)2!
70--)72). -)&&!4)25)) -!&)/)-!7*3 '2078**)-7%)&!8&%-J! 5(/)1)2! ,)2\$0.&! (- .! (1&0! %- /)&2%J(2)!
/01(2%1%23!1%-?(J)&!43!)&2% , (2%-J!CDEFG!&')7%B%7(2%0-&W!2\$)3!B%- .! /(*%08&! -0-H\$0 , 0J)-08&!
&' %110/) *&! (- .!'0&&%41)!diversification benefits within intra-week to intra- monthly time
horizons for specific pairs.!

MO&2!*)7)-2!3;! FO*4)2)!2!(1@!90POP>!analyse the contagion effects between Chinese stock
markets resulting from the COVID-2019 pandemic; the evidence based on high-frequency
data suggests an increase in the dynamic correlations between Chinese stock indices, gold and
Bitcoin, i.e. the latter do not act as hedges, or safe havens, but instead amplify contagion.
Similar conclusions are reached by Conlon and McGee (2020) vis-à-vis the S&P500. In
general, cryptocurrencies seem to be suitable for diversification purposes but not as a hedge
(see Gil-Alana et al., 2020; Liu, 2019; Tiwari et al., 2019, Feng et al., 2018).

.%BB)*-2! 23 ')&;!2(*J)2&! (- .! -8 , 4)*! ')*! .(3! 0B! 734)*! (22(7?&! (&!)+ '1(%-).!4)105@!^-!4*%)B;!

t9+ !o! W r>!i!90u> !o!G !o !)+ '9H!

'(* (,) 2) * &! (- . ! J ; ! (- . ! (- . ! J *) &') 72 % /) 13 W ! (- . ! J ; ! (- . ! (

/(*(41)!2*('0! #)\$!F\$%7(J0! :0(*.! d '2%0-&! =+7\$(-J)!9F : d=

K%- (113;! 5)! 70 , '82)! 70- .%2%0- (1! 70**)1(2%0-&! 4)25))-! : %270%-! (- .! <%2)70%-! (&! \$ y9}\$ \$ }\$ > ;!!=2\$)*8 , !(- .! : %270%-!(&! \$ y9}\$ \$ }\$ > ;!(- .!=2\$)*8 , !(- .!<%2)70%-! (&! \$ y9}\$ \$ }\$ > ;! *)&')72%/)13 ;! (- .! 2)&2! B0*! %-7*)(&)&! .8*%-J! .(3&! (22(7?&! 5)*)*J%&2)* .!70 , ' (*).!20! .(3&! 5\$)-!(22(7?&! .% .!-02!0778*#!#\$)!2)&2!*)&812&!(*!)* '0*2) .!%-!#(41)! V@!
!

UI=D))O%?;''??%(4)(D)@K&W&' '\$@?)

`-!0*.)*!20!2)&2!2\$)!(.) [8(73!0B!2\$)! , 0.)1&;!<68-Jb : 0+!'0*2 , (-2)(8!2)&2&! 5)*!) '*B0* ,) .!0-! 2\$)! &2(- .(*.%c) .! (- .! &2(- .(*.%c) .! &[8(*) .! *)&% .8(1&@! d /)* (11;! 2\$)! *)&812&! %- .%7(2)! 2\$(2! 2\$)! &)1)72) .! RDEHCDEFG9";">! &')7%B%7(2%0-! 7('28*)&! &(2%&B(720*%13! 2\$)! ')*&%&2)-7)! %-! 2\$)! /01(2%1%23!0B!7*3 '2078**)-7%)&!%-!(11!)&2% , (2) .! , 0.)1&@!#\$)*!%&!)/% .)-7)!0B!7(8&(1%23!)BB)72&!%-! 2\$)!70- .%2%0- (1! ,)(-!(- .!/(*%(-7);!

=2\$)*8 , !91 i!HP" "V> ;! 5 \$%7\$!&8JJ)&2&!2\$(2!7*3 '2078**) -73!%- /)&20*&!*)(72!20!734)*!

K%-(113;!2\$*)!%&! (1&0!)/%.)-7)!0B!70H , 0/) ,)-2!4)25)))-!7*3 '2078**)-7%)&;! (&! &\$05 -!43!2\$)!
70- .%2%0-(!70**)1(2%0-&!042(%-). !B*0 , !2\$)!RDEHCDEFG9";">! , 0.)!9K%J8*)!e>@!`-!' (*2%781(*;!
5\$)-! (22(7?&! (*)! -0! 2(?)-! %-20! (7708-2;! 2\$)! 70- .%2%0-(! 70**)1(2%0-&! 4)25)))-! 2\$)! 2\$*)!
7*3 '2078**)-7%)&!(*)!

W&D&, &4; &?)

)

D. *%(-;! #@!(-. !M@ I @! : *8--)* ,)%)*!90P" \>;! fFOR(Eg;!D ,) *%7(-!=70-0 , %7!E)/%) 5;! "P\;!V;! "VPQH"Ve"@!

!

Dl)+(-.) *;!V;!

!

"\

: 0**%;!]@! 90P"Y>! fF0- .%2%0-(1! 2(%1H*%&?! %-! 7*3 '2078**)-73! , (*?)2&g;! -. \$/&%0" .1" ; <D(/(,%0"
+(&%&, *;!QP;!"H"Y@!
!
: 08*%;! =@;! C8'2(;! E@;! #%5 (*%;! D@! (-.! E084(8.;! S@! 90P"V(>;! fS0)&! 4%270%-! \$).J)! J104(1!
8-7)*2(%-23~! =/%.)-7)! B*0, ! 5(/)1)2H4(&).! [8(-2%1)H%-H[8(-2%1)! *)J*)&&%0-&

d , (-)HD.6)'0-J;!M@!(-.!^@!D1(J%.).)!90P"Y>;!fM812%*)&0182%0-!(-(13&%&!(-.!&'%110/)*&!OB!
, (60*!7*3'2078**)-73! , (*?)2&g;! ! *5*%/ , A"/(&"2&'*/&%/'(. &%0"=\$5(&*55"%&7"+(&%& , *;!eY;! "Y"HOP\@!
!

E(&?%-;!M@!(-.!T)* , (7?;!S@!90P"\>;!fS%J%2(1!78**)-7%)&;! .)7)-2*(1%c) . !!) . J)*&;!(- . !2\$)!B828*!)
OB!7)-2*(1!4(-?%-Jg;!G%/'(. &%0"=\$/*%\$.!"; , . & . <(, " ! *5*%/ , A6"C . /4(&>"D%D*/"G.K"MMMOPK""
"

A7\$%11%-J;!<@!(-.!Z\$1%J;!G@!90P"U>;!fA0 ,)!&% , '1)!4%270%-!)70-0 , %7&g;! . . \$/&%0" . !" 3 . &*%/8"
; , . & . <(, 5;! "P\;! " \b0\@!
!

Tiwari, A., I. Raheem, and S. Kang (2019), “Time-varying dynamic conditional correlation between stock and cryptocurrency markets using the copula-ADCC-EGARCH model”, *Physica A: Statistical Mechanics and its Applications*, 535.

Z , (;! M@! (- . ! ^(. , (/ (2\$%;! C@! 90P"N>! D! A8*/)3! 0-! R(*%08&! F34)*! D22(7?&! (- . ! #)\$)%*!
F1(&&%B%7(2%0-;!2&'*/&%/'(. &%0"-. \$/&%0" . ! "G*H. /4"9* , \$/('8;"Q9Q>;!' ' @!NYPbNY\@!
!

Z*[8\$(*2;!D@!90P"\>;!f#)\$)!%-)BB%7%)-73!OB!4%270%-

W% ;5#!P!! " %%!0#/-&.\$'.*)!

!

"#S)#&'(!

)(*+\$%,-%./!

0.1(\$/2(-

34&(\$5

W%;5#!NH! "#/-&.\$'.7#!S'%'.-./!

W% ;5#!?H! = 45'.7%&.%'#! JDQCAEP2PF!@%&% (#'##&/!, /'. (%'#/!Y!C&8\$ '*!C4&&#)-.#/!C8;##KD''%-M/!!
!_____!

!

W%;5#![H! = 45'.7%&.%'#! JDQCAEP2PF!@%&% (#'#&/!, /'. (%'#/!Y!C8;#&KD''%-M/!;8!W%&<#!

!

!

!

!

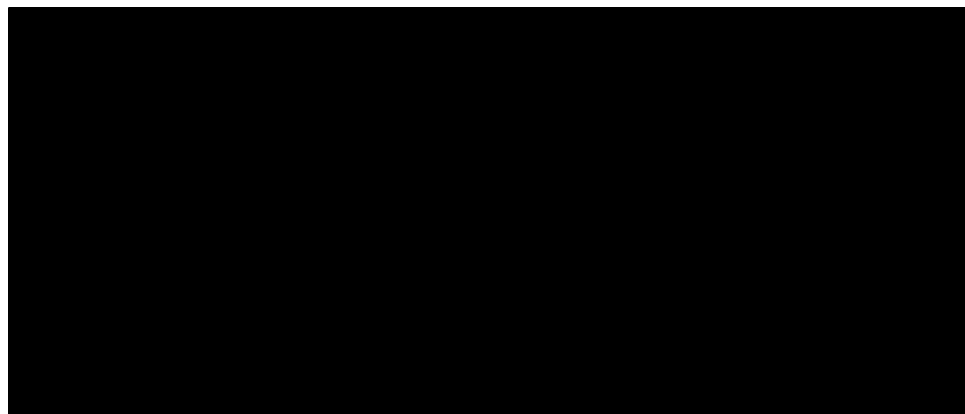
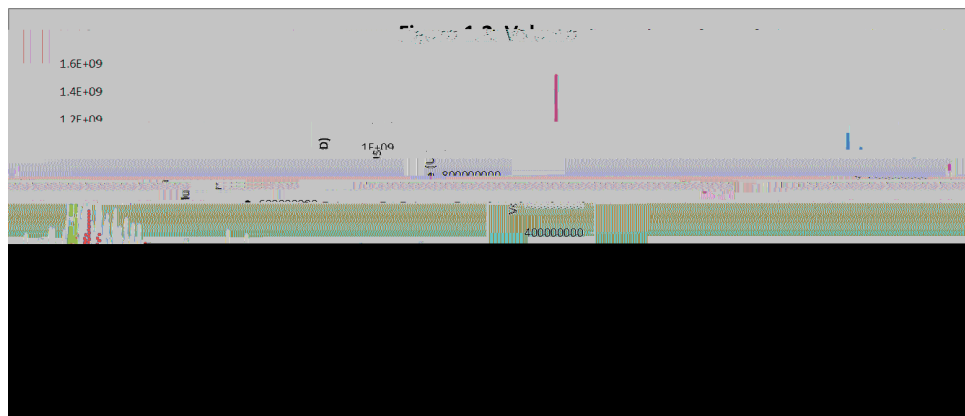
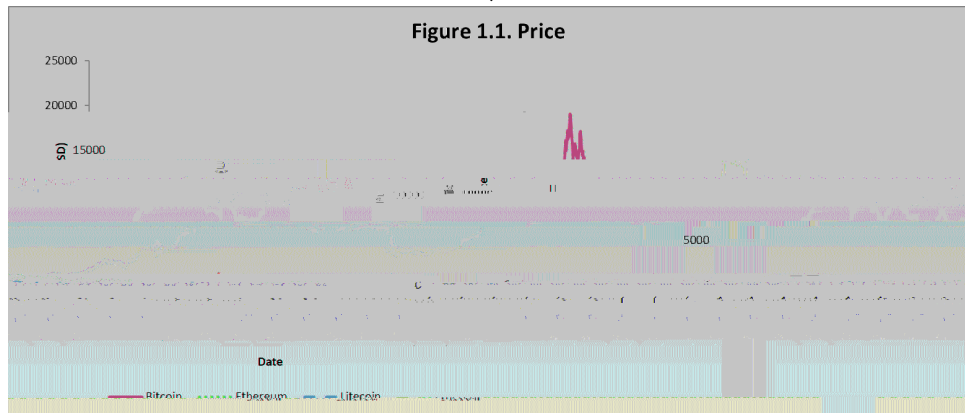
!

W% ; 5#!\h! = 45'.7%&.%'#! JDQCAEP!PF!@%&% (#'#&/!, /'. (%'#/!Y!C8; #&KD'%-M/!'*!'G#!6). '#0!S'% '#/!
! !
_____ !

W% ;5#!]h!W#/'/!*+!CG%)<#/.!)!C*)0.'*%)%5!C*##5%!.*)/!!
!

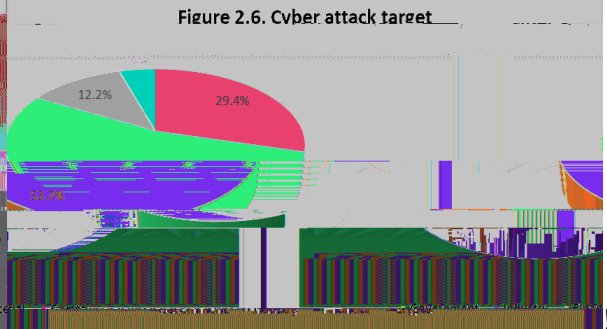
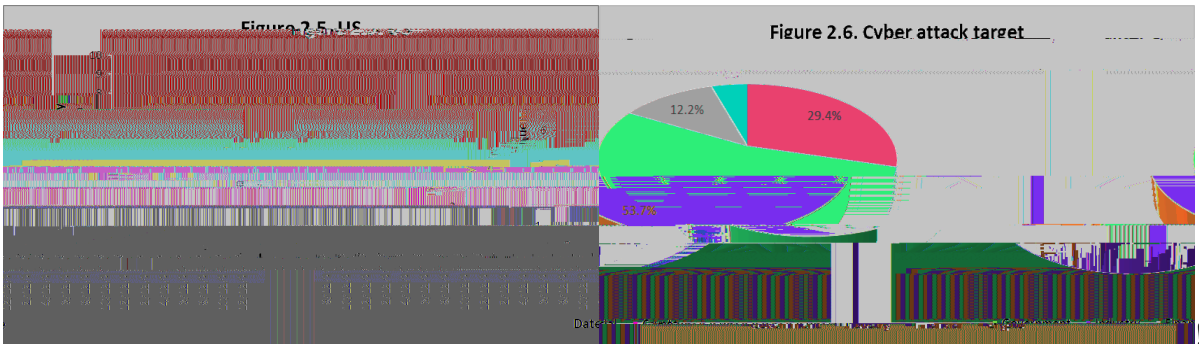
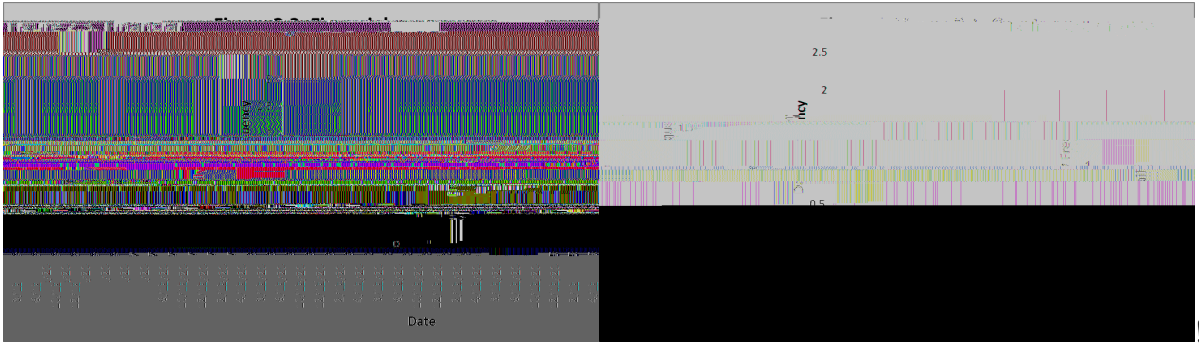
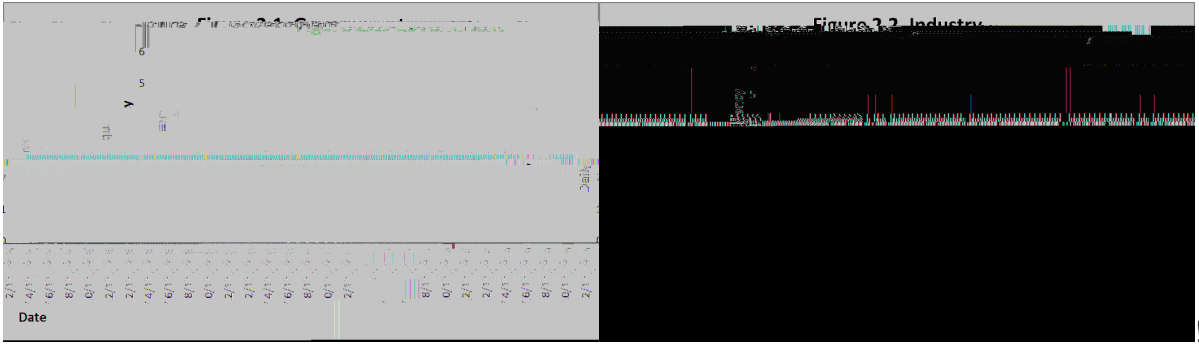
B?@C=>!9D!8EC=>0F7F8GH!!	K97FL!B?@C=>!9D!8EC=>0	O9>>=LF729:H!!
I=>!JFE	F7F8GH!&M!9N=>!<=!797FL!	
!	!	627892: !0!A27892: !
		!
		627892: !0! ;7<=>=?@!
		!
		;7<=>=?@!0!A27892: !
		!
		P=F: ! 1F>2F: 8=! Q=8=8!S-

1.<4&#!P!!C&8\$!*-4&&#)-.#!/
!



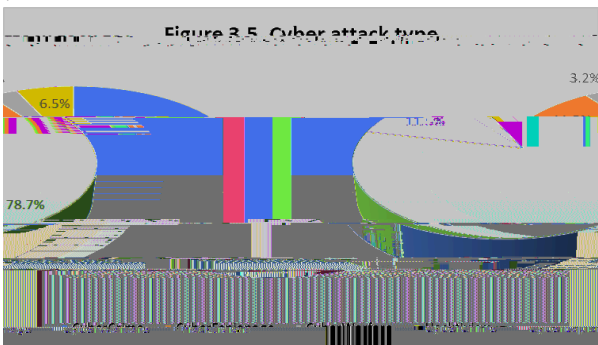
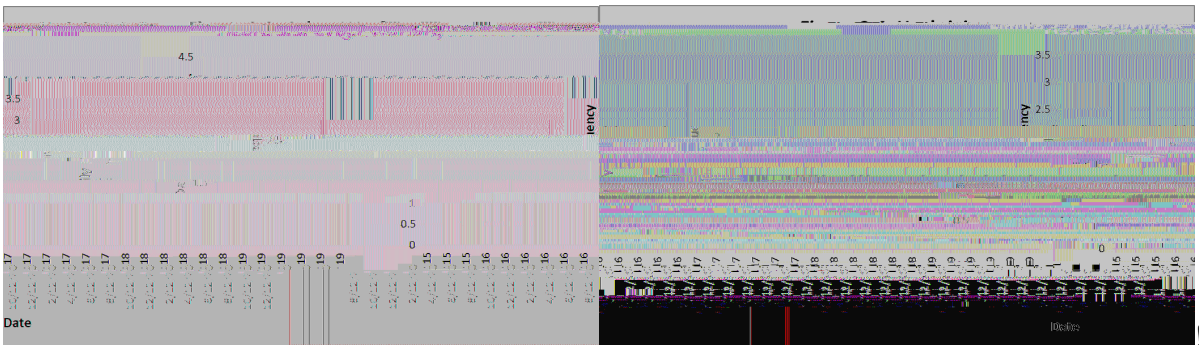
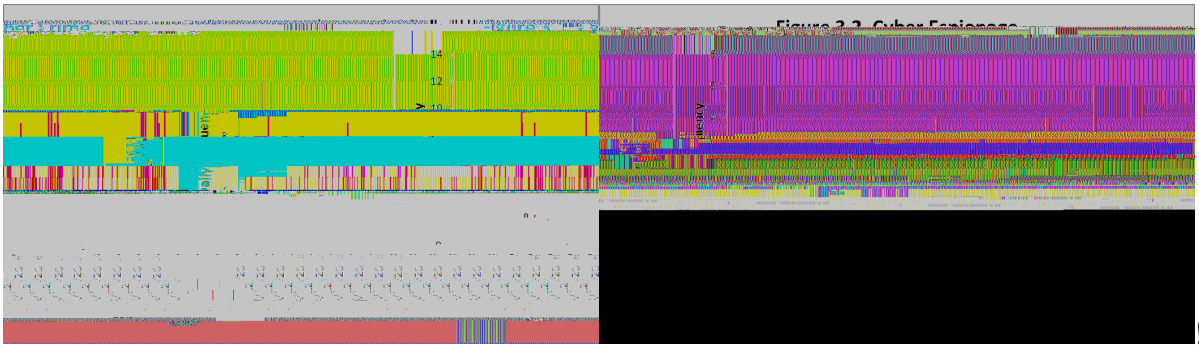
!
!
!
!
!

1.<4&#!N!C8;#&KD'%-M/!;8!W%&<#!



!
!
!
!
!
!
!
!
!
!

1.<4&#!?#!C8;#&&D''%-M/!;8!W8\$#!



1.<4&#!Z#!C*)0.'.*)%5!C*##5%'.*)/!

