

% X L O G&LRQPJP & Q L W \ R I 6 R O X W L R Q Z L W K 5 H V H W W

*ULVZROG ..!6P DQG 6FDWHV -0

-DFREV 6FKRRO RI 0HGLFLQH DQG %LRPHGLFDOR GRNLDWQ PHXVIBDWDW86\$ QLYHUVLW\ RI 1HZ <
\$VVLVWDQW 3URIHVVRU 6FKRRO RI 6RFLDO :RUN 6WDWH 8QLYHUVLW\ RI 1HZ <RUN DW %XIIDOR 86\$
6FKRRO RI 3XEOLF +HDOWK DQG +HDOWK 3URUNVDWWR%QXII BDWDW86\$ QLYHUVLW\ RI 1HZ <
&RUUHVSQRQGLQJLWDWKRUVZROG 0' 03+ \$VVRFLDWH 3URIHVVRU RI)DPLO\ 0HGLFLQH 3V\FKLDWU\ DQG 3
RI 0HGLFLQH DQG %LRPHGLFDO 6FLHQFHV 6WDWH 8QLYHUVLW\ RI 1HZ <RUN DJW L%XZI RDOR E 86\$ OTR OH GX
5HFHLYHG-GQWH \$FFHSWHEG GDWHEOLVKHG GDWH)HE
&RS\ULJKW < *ULVZROG .6 HW DO 7KLV LV DQ RSHQ DFFFHVV DUWLFOH GLVWULEXWHG XQGHU WK
XQUHVWULFWHG XVH GLVWULEXWLRQ DQG UHSURGXFWLRQ LQ DQ\ PHGLXP SURYLGHG WKH RULJLQDO D

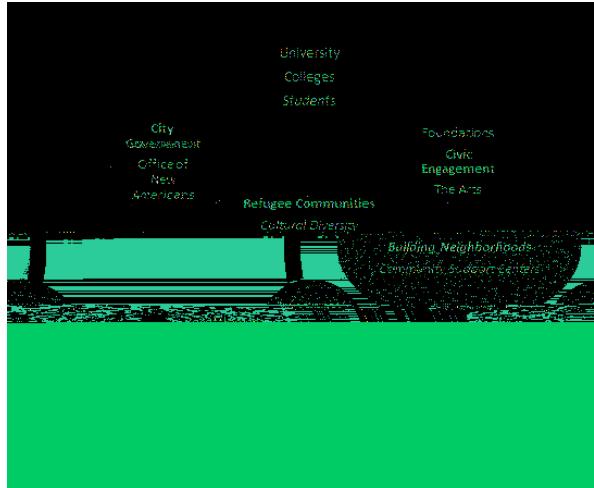
\$EVWUDFW

7KHFULVLV RI PLJUDQWV DFURVV WKH JOREH LV RI LQFUHDVLQJ FRQFHUQ DQG F
SURYLGLQJ FRPSHWHQW HTXLWDEOH DQG FXOWXUDO\ DSSURSULDWH VHUYLFHV
VROXWLRQV RIWHQ ILQG WKDW KHDOWK FHQWULF GLVFLSOLQHV DUH QRW HQRXJK
DUULYLQJ SRSXODWLRQV ,Q WKLV DUWLFOH ZH SUHVHQW WKH 3&RPPXQLWLHV RI
5HSRJHDOWK LV D &RPPXQLW\ SDUWQHUVKLSV SHUVRQ FHQWHUHG KHDOWK FDUH DQG D IR
VWURQJ FRPPXQLW\ SDUWQHUVKLSV SHUVRQ FHQWHUHG KHDOWK FDUH DQG D IR
IRFXVHG ILUPO\ RQ WKH GHWHUPLQDQWV RI KHDOWK WKDW WRGD\ VKDSH RXU WK
RI GLVSDULWLHV ,Q WKLV DUWLFOH RQH FRPPXQLW\ \V HIRUWV GHPRQVWUDWH

\$

PPXQLWLHV KHOSLQJXBRQXWIKHV VE\LQH\K RPLQJ WKHP

KH 8 6 6WDWH 'HSDUWPHQW RI QSHM KHHIHGHUDO
BQXGHUWRQG DEXOH DSCWVDOZBWDQFLQHVV LIQD YQOLPYFLIGVWD WR WK
PPXQLWLHV KHOSLQJXBRQXWIKHV VE\LQH\K RPLQJ WKHP
SRQ DURVLDWHLQJ WKHP DW DLUSRUW WUDLQ RU EXV V
UDQJLQJ KRXVLQJ OLQNLQJ WR KHDOWK DVVHVVPHQWV DQG KHDO



)LJXU&RQWULEXWLQ%XWHDWLRQPRPUVQBWWRKIH

WR GHYHORS DQG VXVWDHLQHSHRDJOWWZDWFPSRU
 E\ LGHDV ZLWKLQ 3UHVLGHQW /\QGRQ %
 VSHDUKHDGHG E\ ODULRQ)ROVRP D 8 6 6
 DQG :HOIDWHDXVKRUV RI)ROVRP UHFRJG
 FRPPXQLWLHV FDQ EH DFKLHYHG ZLWK VV
 SHUVRQ FHQWHUHG KHDOWK FDUH DQG D I
)ROVRP IRUPXORQGWKH GHWHUPLQDWV RI K
 RXU WKLQNLQJ DERXW KHDOWK KHDOWK
 > @ \$ FRPSHOOLQJ DVSHFW RI)ROVRP Z
 GLVFRXUVH f8QGHUO\LQJ WKH PRRG RI D
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 DPRQJ HWKQLF JURXSV VRFLR HFRQRPLF
 PD\ DGYDWHUFRQFHUWHG FRPPXQLW\ DFWR
 \HDUV ODWHU LQ RXU VW & HQWXU
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 VWXGLHV WKDW KHDOWK GLVSDULWLHV
 FRPPXQLWLHV&' UHSRUW RQ KHDOWK GLV
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 WKDW UHVLGHQWV LQ PRVWO\ PLQRULW\ F
 VRFRLRHFRQRPLF VWDWXV JUHDWHU EDU
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 VHUYLHV > @ & KDOOHQJHV H[LVW LQ WKH RQJLQJ GHOLYHJU RI VRFRLDO VHUY
 KHDOWK FDUH MRE RSSRUWXQLWLHV KRXVLQJ HGXFDWLRQ DQG RWKHU UHDOP
 ZLWKLQ FXOWXUDOORQ DQG OLQJXLVWLFLDQH SURYVLRQ
 ORFDOLW\ EDVHG RQ WKH VVUHQJWKV WDOHQWV DQG SURYVLRQ
 VROXWLRQV PXVW EH IRUPHFQHEQDQRMZHUVWVWQH
 UHIXJHH FRPPXQLWLHV

+RZHYHU DV PRUH UHIXJHHV HQWHU
 JRLQJ FRQFHUQV DERXW ORFDO FDSDFLWV WR SURYVLRQ
 VHUYLHV > @ & KDOOHQJHV H[LVW LQ WKH RQJLQJ GHOLYHJU RI VRFRLDO VHUY
 KHDOWK FDUH MRE RSSRUWXQLWLHV KRXVLQJ HGXFDWLRQ DQG RWKHU UHDOP
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 VROXWLRQV PXVW EH IRUPHFQHEQDQRMZHUVWVWQH
 UHIXJHH FRPPXQLWLHV

&RPPXQLWLHV RI 6ROXWLRQ

\HDUV ODWHU LQ RXU VW & HQWXU
 RWKHU ERGLHV HFKR WKH VHQLPHQW
 VWXGLHV WKDW KHDOWK GLVSDULWLHV
 FRPPXQLWLHV&' UHSRUW RQ KHDOWK GLV
 FLWHLW WKDW fDSSUR[LPDWHO\ FRPPXQLW
 WKDW UHVLGHQWV LQ PRVWO\ PLQRULW\ F
 VRFRLRHFRQRPLF VWDWXV JUHDWHU EDU
 JRLQJ FRQFHUQV DERXW ORFDO FDSDFLWV WR SURYVLRQ
 VHUYLHV > @ & KDOOHQJHV H[LVW LQ WKH RQJLQJ GHOLYHJU RI VRFRLDO VHUY
 KHDOWK FDUH MRE RSSRUWXQLWLHV KRXVLQJ HGXFDWLRQ DQG RWKHU UHDOP
 ZLWKLQ FXOWXUDOORQ DQG OLQJXLVWLFLDQH SURYVLRQ
 ORQJOJOLYKVSURHDLQJSHUVRQVQDQGOLWHUDEQDQGLQKUH
 SURYVLRQVWKHUVWVWQH
 SURYVLRQVWKHUVWVWQH > @

7DEOH FRQWUDVWV WKH SUHFHSWV RI)
 DQG WKH :RUOG +HDOWK 2UJDQL]DWLRQ

H)ROVRP 5HSRUW f+H\$VQML\$VdHWBQ&RVPPXQLW\
 EOXSULQW IRU WKH LQWHJUDWLRQ RI SXEOLF KHDOWK DQG PHGLFDO FDUH LQ R

)ROVRP +HDGLQJV	'HWHUPLQDWV RI +HDOWK	:RUOG +HDOWK 2UJDQL]DWLRQA
&RPSUHKHQVLYH SHUVRQDO KHDOWKWUWVHMLFHV	5HGXFH VRFRLDO GLVSDULWLHV DQG H[FOXVLRQ	
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+HDOWK 3PDQSRZHU' ,QFRPH DQG VRFRLDO VWDWXV LQGHQWVWV
 3K\VLFDQH QYLURQPHQW GLVSDULWLHV DQG H[FOXVLRQ

7KH FRQVXPHU LPSRUWDQFH 6RFLDNQRAZISQJUWQGHWZRUVN FXQWJQH]IF&VWHRPVLFWWDEQVLMIGRQQ SHRS
 XQGHUVWDQGLQJ WKH SHRQH EHLQJ VHUHG KRXVLQJ

3DUWQHUV LQ SURJUHVW ± JRYH UQQRPHQWMDWQ&QYRLOQGQWMMUUVHQHJQFWUHQQH/SVWVWVNHKROGHU SDUWLFSD
 \$FWLRQ 3ODQQLQJ ± /HDGHUVKLS+BDQW&WPLS BQW\$DQHQMFMQWV DQGOSDQDFUDWLRQ DQG SROLFI GLDORJ

A +HDOWK ,PSDFW \$VVHVVPHQW +,\$

KHDOWK R HQRQQLHFS W RI D &RPPXQLW\ RI Q 6 R DIXQWL RJQ I S WIR NY GLHQL W L D O O \ VHW WO H G\QDPLF VWUXFWXUH ZLWKLQ ZKLFK KCDLYHH UEFHHF RFRPH PDX QVL RMLUHFVH R X FLKQ FDJH D V H G UHVHWWOLQJ UHIXJHH SRSXODWLRQV B B Y DWG D C O H J DVW S R J Q E O W K P H E H S RFURWD OUHMFRIJQF RI JUDVV URRWV JDWKHULQJV 8QLYHUVLW\ VDSRGU WRDQVLIRJH E B S C R S \ RSHUQWH VKHLBQW\ FRPPXQLW\ RUJDQL]DWLRQV DQG DJH QDFG H T X DJRHYH UQPDLOMIGO L Q R R G H U H S U H W Q G V 5 FLWL]HQV

V SHFL\} W DO OH W L Q J UHIXJHH SRSXODWLRQV

W KH ODZ PDQGDWLQJ XVH RI WUDLQHG LQ

, QWHJUDWLQJ 'LYHUVLW\ a (YRQWQVW R F O R M R F Q A I REUH O H Z M Q C R Z U I R U Q

UHVHWWOHG UHIXJHHV DQG LPSURYHG D

, Q 1HZ <RUN 6WDWH UHPDLQHG WHKH UHIXJHHV DQG LPSURYHG D

G H V W L Q D V H R D Q V & D O L I R U Q L D , Q 1HZ <RUN WRRN

UHIXJHHV PRVW RI ZKRP % X RDQ R 6 L P L Q D U H F W D Q A H Q J H D Q G U H F R P P H Q G D

> @ W Z % X v D 5 C H R X J H H + H D O W K 6 X P P L W V

2 Y F H R U * O R E D O + H D O W K (T X L W \ 2 * + (L Q V

& R X Q W U L H V R I R U L J L Q I R U P R V W U H F H D Q G P H B D Y D K O S U R U H V % X R D Q R C O K X M D Q U W X D

6 R P D O L D D Q G 6 X G D Q : L W K I R X X U V D J O D W H U H V P D U F R W V P K R Q D U H A K L S D Q G H Y D O X D W L F

V W U R Q J W U D G L W L R Q D Q G O R Q J H [S H U L R F Q V H R Q A H K Q F R P H D Q W K P D Q Q D Z M V O Q P H Q V

UHIXJHHV WKH : H V W H R U Q B 1 H D M R U G D R X H L R O J H H 6 W U D W H J L F \$ G Y L V R U \ * U R X S F R Q

D Q G O R Z H U F R V W V R I O L Y L Q J W K D Q D H Q G D M D L Q D E W D H W H Q W R A Q G V H W D J H H 6 X P P L W V

D U H D V \$ V L Q P D Q \ R W K H U 8 6 F % W L D D Y R Z K H U H UHIXJHHV UHVHWWOHG L Q

F R P P X Q L W \ R I V R O X W L R Q L V G H Y H O R S L Q D P L W R X L S D Q M K Y H Q W K H \$ P H Q X P D L W G H V F

> @ D Q G D O D F N R I W U D X P D L Q I R U P H G F D U H S

P H G L F D O S U R Y L G H U L W H D E H D R X W X Q M X Q W Q F

% H F D X V H R I D V W U R Q J H F R Q X P D Q R V U E H Y D O H H V K R P P F X W L R H V V X E R S W L P D O L Q W

V L J Q D O H G D V R Q H R I W K H W R S f U L V L Q S K D W P D H V G H V Q D Q H U L E Q X U Q S D U S R R X H F W B

Y LEUDQW LPPLJUDQW DQG UHIXJHH F R P S U R Q K W G H U V > D Q \ P D Q L Q F M F X O W D O H G X F D

\$ U H S R U W Q J W K H Q L Q V W H U Q 1 H Z < R U X J H H D I H W A Q G X D O V S U R Y L G H U V R I F D U

D V V H V V H G W K H X U E D Q D S H R H M U H L W K H R P D M R U L W \ R I

7 K H 6 W U D W H J L F \$ G Y L V R U \ * U R X S I R U 5 H I X J H H + H D O W K Z D V F U H D W H G R X W R I D Q H [S U H V V H G Q H H G I R U S U R Y L V L R Q I R U U H I X J H H V L Q % X I I D O R D Q G H V W H U Q 1 H Z < R U N 7 K H D G Y L V R U \ J U R X S L V F R P S R V H G R I F R P P X Q L W \ V X S S R U W F H Q W H U V D Q G 8 Q L Y H U V L W \ D W % X I I D O R I D F X O W \ , W L V I X Q G H G D Q G I D F L O L W D W

2 I I L F H R I * O R E D O + H D O W K , Q L W L D W L Y H V

& R Q W U L E X W L Q J D J H Q F L H V L Q F O X G H

% X I I D O R , P P L J U D Q W 5 H I X J H H (P S R Z H U P H Q W & R D O L W L R Q % , 5 (&

% X U P H V H & R P P X Q L W \ 6 X S S R U W & H Q W H U

& D W K R O L F & K D U L W L H V R I % X I I D O R

+ (\$ / , Q W H U Q D W L R Q D O , Q F

+ H O S L Q J (Y H U \ R Q H \$ F K L H Y H / L Y H O L K R R G

, Q W H U Q D W L R Q D O , Q V W L W X W H R I % X I I D O R

- H U L F K R 5 R D G & R P P X Q L W \ + H D O W K & H Q W H U

- H Z L V K) D P L O \ 6 H U Y L F H R I % X I I D O R D Q G (U L H & R X Q W \

- R X U Q H \ V (Q G 5 H I X J H H 6 H U Y L F H V , Q F

8 Q L Y H U V L W \ D W % X I I D O R - D F R E V 6 F K R R O R I 0 H G L F L Q H D Q G % L R P H G L F D O 6 F L

8 Q L Y H U V L W \ D W % X I I D O R 6 F K R R O R I 1 X U V L Q J

8 Q L Y H U V L W \ D W % X I I D O R 6 F K R R O R I 3 X E O L F + H D O W K D Q G + H D O W K 3 U R I H V V

8 Q L Y H U V L W \ D W % X I I D O R 6 F K R R O R I 6 R F L D O : R U N

: 1 < & H Q W H U I R U 6 X U Y L Y R U V R I 7 R U W X U H

D S U R J U D P R I - H Z L V K) D P L O \ 6 H U Y L F H L Q F R O O D E R U D W L R Q Z L W K 8 % ' H S D U W P H Q W R I) D P L O \

7 D E O \$ 5 H I X J H H V W U D W H R J Y F R D G O R V E D Q K H B D S V K H T X L W \ % M W D D M H R X Q L Y H U V L W \ R I 1 H

, Q W K H 6 X P P L W U H F R P P H G D G L D H D V R F D U L W R K F Q B G R Q I S D Q G L Q J W K H O R F D O S U P H D F K D U H D F R O H G E \ D 8 Q L Y H U V L W \ D Q G W D B H N X H I D F R P P X Q L W \ P H P E H U G H Y H O R S L Q J D F R P P X Q L W \ K H D O W K Z R U N H U Q H W Z R U N K H U L Q D O G W U D L Q L Q J U H I X J H H V H Q K D Q F L Q J U H V D U F K H G X F D W R Q W U D L Q L Q D O G F H V W U S U D F W L Q F X O W X U D O D Q G O L Q J X L V W L F D O O \ D S S U R S U L D W H P H Q W D O K H D O W K V H U Y L F H V X Q G H U V W D Q G F X U U H Q W K H D O W K V W D W X V D Q G Q H H G V R P U H I X J A H V I R U S U H Y H Q W L Y H D Q G Z H O O

I RXQGDWL RQV FLYLF HQJDJHPHQW DQG LQGLYLGXDO FRQWULEXWL RQV 6RPH

f) ROVRPg)RUZDUG

6WURQJ FRPPXQLWI SDUWQHUVKLSV SHUVRQ FHQWHUHG KHDOWK FDUH DQG D
IRFXV RQ SXEOLF KHDOWK FLYLOLWI RI UHODWLRQVKLSV DQG D JRDO RI GLVSD
UHGXFWDQH HFKRHV RI WKH)RO%RPD6IRSRUW DUH SDUW RI
UHVXUJHQFH LWV HYROYLQJ FRPPXQLW\ RI VROXWLRQ IRU UHIXJHH LQGLYLGXD
DQG IDPLOLHV (YDOXDWLRLQ DQG DVVHVVPHQW RI SROLFLHV DQG SURJUDPV
FRQWULEXWLQJ WR UHIXJHH KHDOWK DQG ZHOOQHVW DUH WDNLQJ SODFH DW PD
OHYHOV 2QH RI WKH LPSRHWRLQWRERDQHWDIOWKH
(TXLWW WR IRFXV RQ D fF\FOH RI SURJUHVVg WKDW IDFLOLWDWHV UHVHDUFK
LPSOHPHQWDWLRQ DQG HYDOXDWLRLQ FHQWHUHG RQ HTXLW\ LQ JOREDO KHDOWK
ZHOO EHLQJ O!LRO PH0 K